

**Journal of the Hong Kong College of**  
**CARDIOLOGY**



Including Abstracts of  
Twenty-Eighth Annual Scientific Congress  
Hong Kong College of Cardiology  
3 July 2020 – 5 July 2020



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# Journal of the Hong Kong College of Cardiology



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# INSTRUCTION FOR AUTHORS

The Journal of the Hong Kong College of Cardiology publishes peer-reviewed articles on all aspects of cardiovascular disease, including original clinical studies, review articles and experimental investigations. As official journal of the Hong Kong College of Cardiology, the journal publishes abstracts of reports to be presented at the Scientific Sessions of the College as well as reports of the College-sponsored conferences.

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- Abstract should be after title page and numbered page 1.
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- Standard abbreviations should be used for all measurements (SI units).

## Text

- The text should follow the abstract and begin on a new page, as should References, Tables, and Legends.
- Abbreviations not defined in the abstract should be explained when they first appear in the text.
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## References

- Number in the order in which they appear in the text.
- Abbreviate titles of periodicals according to the style of the Index Medicus.
- Follow the format (arrangement, punctuation) shown below:

### Periodicals

1. Lewis T. Paroxysmal tachycardia. *Heart* 1909;1:43-72.  
(if more than three authors, please use "et al." after the third).

### Books (edited by other authors of article)

2. Furman S. Pacemaker follow-up. In Barold SS, (eds): *Modern Cardiac Pacing*. Mount Kisco, New York, Futura Publishing Company, 1985, pp. 889-958.

### Books (identical author and editor)

3. Chung EK. *Principles of Cardiac Arrhythmias*. Baltimore, MD, Williams & Wilkins, 1977, pp. 97-188.

## Abstracts

4. Same as periodicals and followed by "(abstract)".

## Tables

- Tables should supplement, but not duplicate, the text.
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## **Authorship in a Scientific Document**

CHU-PAK LAU<sup>1</sup> AND CHUNG-WAH SIU<sup>2</sup>

From <sup>1</sup>Co-Editor, Journal of the Hong Kong College of Cardiology; <sup>2</sup>Editor-in-Chief, Journal of the Hong Kong College of Cardiology

Multi-authored articles on scientific research are nowadays the norms rather than the exceptions. This is due to the increasing complexity of modern research, both basic and clinical, that involves different competencies and often in a different location either locally or internationally.<sup>1</sup> Often citation impact is greater in these papers with international co-operation. Co-operative research also introduces new ideas and centre advancement. However, this necessarily leads to problems such as relative author contribution, first and last authors issues, co-author self-citation and document accountability. In some situations, 'ghost' authors (e.g. an industrial sponsor) and 'guest' authors (e.g. a well known investigator in the field) may post further issues.

The International Committee of Medical Journal Editors (ICMJE)<sup>2,3</sup> has introduced the requirements of authorship (Table 1). These include (1) Substantial contribution to the conception, trial design, and data collection and interpretation. (2) Drafting or

revising on the manuscript. (3) Final approval of the submitted manuscript. (4) Accountable for all aspects of the work and ensuring questions pertaining to accuracy and integrity of any part of the work to be investigated and resolved. The last new requirement asks authors not only to be (morally) responsible for the work, but also in some way accountable. It is of course unreasonable to hold authors to be morally responsible for every case of research misconduct considering the complexity of modern research. Rather, this criterion suggests each author should collaborate with misconduct investigators if the paper is called into questions.<sup>2</sup>

The Journal of Hong Kong College of Cardiology (JHKCC) is an affiliated member of the Editors' Network, European Society of Cardiology (ESC) Task Force. In this issue of the JHKCC, the Network has published an article on problems encountered by cardiovascular Journal Editors not only on what constitute authorship, but also the problems faced especially for multi-authorship articles. These are summarized in the Table. All readers and potential contributors are suggested to read and appreciate these issues.

Much of the problems encountered if potential authors of an article should decide before the beginning of their research on their relative role to justify authorship after reflections of the above. In addition, the order of authorship in the final paper should it appear should be considered a prior, but subjected to change with agreement, to avoid future misunderstanding.

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Street, Central, Hong Kong

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**Table 1. Issues on Authorship in a Scientific Document**

<b>Authorship Requirements</b>	<b>Remarks</b>
Contributions	<ul style="list-style-type: none"> <li>• Significant role in conception, design, data collection and interpretation</li> <li>• Document drafting and revising</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>• Moral obligation to ensure appropriate work</li> </ul>
Approval	<ul style="list-style-type: none"> <li>• Final approval of manuscript to be submitted</li> </ul>
Accountability	<ul style="list-style-type: none"> <li>• Facilitate and co-operate when integrity of research is in question</li> </ul>
<b>Multi-Authorship</b>	<b>Remarks</b>
Publishing individual contributions and conflicts	Standard forms
By-line location and hierarchy	<ul style="list-style-type: none"> <li>• First author (co-first)</li> <li>• Last author (co-last)</li> <li>• Guarantor</li> <li>• Percentage of contribution</li> </ul>
Beaches in authorship	<ul style="list-style-type: none"> <li>• Ghost authors</li> <li>• Guest authors</li> </ul>
Citations	<ul style="list-style-type: none"> <li>• Co-authors self-citation</li> </ul>

## References

1. Helgesson G, Eriksson S. Responsibility for scientific misconduct in collaborative papers. *Med Health Care Philos* 2018;21:423-30.
2. The International Committee of Medical Journal Editors. Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals. <http://www.icmje.org/recommendations/>.
3. Alfonso F, Zelveian P, Monsuez JJ, et al; Editors' Network, European Society of Cardiology (ESC) Task Force. Authorship: from credit to accountability. Reflections from the Editors' Network. *J HK Coll Cardiol* 2020;28:3-10.



# Authorship: From Credit to Accountability. Reflections From the Editors' Network

FERNANDO ALFONSO,<sup>1</sup> PAROUNAK ZELVEIAN,<sup>2</sup> JEAN-JACQUES MONSUEZ,<sup>3</sup> MICHAEL ASCHERMANN,<sup>4</sup> MICHAEL BOEHM,<sup>5</sup> ALFONSO BUENDIA HERNANDEZ,<sup>6</sup> TZUNG-DAU WANG,<sup>7</sup> ARIEL COHEN,<sup>8</sup> SEBIJA IZETBEGOVIC,<sup>9</sup> ANTON DOUBELL,<sup>10</sup> DARIO ECHEVERRI,<sup>11</sup> NURAY ENÇ,<sup>12</sup> IGNACIO FERREIRA-GONZÁLEZ,<sup>13</sup> ANETTA UNDA,<sup>14</sup> ULRIKE FORTMÜLLER,<sup>15</sup> PLAMEN GATZOV,<sup>16</sup> CARMEN GINGHINA,<sup>17</sup> LINO GONCALVES,<sup>18</sup> FAOUZI ADDAD,<sup>19</sup> MAHMOUD HASSANEIN,<sup>20</sup> GERD HEUSCH,<sup>21</sup> KURT HUBER,<sup>22</sup> ROBERT HATALA,<sup>23</sup> MARIO IVANUSA,<sup>24</sup> CHU-PAK LAU,<sup>25</sup> GERMANAS MARINSKIS,<sup>26</sup> LIVIO DEICAS,<sup>27</sup> CARLOS EDUARDO ROCHITTE,<sup>28</sup> KJELL NIKUS,<sup>29</sup> ECKART FLECK,<sup>30</sup> LUC PIERARD,<sup>31</sup> SLOBODAN OBRADOVIĆ,<sup>32</sup> MARIA DEL PILAR AGUILAR PASSANO,<sup>33</sup> YANGSOO JANG,<sup>34</sup> OLAF RØDEVAND,<sup>35</sup> MIKAEL SANDER,<sup>36</sup> EVGENY SHLYAKHTO,<sup>37</sup> ÇETIN EROL,<sup>38</sup> DIMITRIS TOUSOULIS,<sup>39</sup> DILEK URAL,<sup>40</sup> JAN J. PIEK,<sup>41</sup> ALBERT VARGA,<sup>42</sup> ANDREAS J. FLAMMER/FRANÇOIS MACH,<sup>43</sup> ALBAN DIBRA,<sup>44</sup> FAIQ GULIYEV,<sup>45</sup> ALEXANDER MROCHEK,<sup>46</sup> MAMANTI ROGAVA,<sup>47</sup> ISMAEL GUZMAN MELGAR,<sup>48</sup> GIUSEPPE DI PASQUALE,<sup>49</sup> KANAT KABDRAKHMANOV,<sup>50</sup> LAILA HADDOUR,<sup>51</sup> ZLATKO FRAS,<sup>52</sup> CLAES HELD,<sup>53</sup> VALENTYN SHUMAKOV<sup>54</sup>; ON BEHALF OF THE EDITORS' NETWORK, EUROPEAN SOCIETY OF CARDIOLOGY (ESC) TASK FORCE.

Affiliations: <sup>1</sup>Chairman Editors' Network, <sup>2</sup>Editor in Chief Scientific Medical Journal <sup>3</sup>Editor in Chief Archives des maladies du coeur et des vaisseaux-Pratique, <sup>4</sup>Editor in Chief Cor et Vasa, <sup>5</sup>Editor in Chief Clinical Research in Cardiology, <sup>6</sup>Editor in Chief Archivos de Cardiologia de Mexico, <sup>7</sup>Editor in Chief Acta Cardiologica Sinica, <sup>8</sup>Editor in Chief Archives of Cardiovascular Diseases, <sup>9</sup>Editor in Chief Medicinski Zurnal, <sup>10</sup>Editor in Chief SA Heart, <sup>11</sup>Editor in Chief Revista Colombiana de Cardiologia, <sup>12</sup>Editor in Chief Kardiyovaskuler Hemsirelik Dergisi, <sup>13</sup>Editor in Chief Revista Espanola de Cardiologia, <sup>14</sup>Editor in Chief Kardiologia Polska, <sup>15</sup>Editor in Chief Cardio News, <sup>16</sup>Editor in Chief Bulgarian Journal of Cardiology, <sup>17</sup>Editor in Chief Romanian Journal of Cardiology, <sup>18</sup>Editor in Chief Revista Portuguesa de Cardiologia, <sup>19</sup>Editor in Chief Revue Tunisienne de Cardiologie, <sup>20</sup>Editor in Chief The Egyptian Heart Journal, <sup>21</sup>Editor in Chief Basic Research in Cardiology, <sup>22</sup>Editor in Chief Austrian Journal of Cardiology, <sup>23</sup>Editor in Chief Cardiology Letters, <sup>24</sup>Editor in Chief Cardiologia Croatica, <sup>25</sup>Editor in Chief Journal of the Hong Kong College of Cardiology, <sup>26</sup>Editor in Chief Seminars in Cardiovascular Medicine, <sup>27</sup>Editor in Chief Journal of Cardiovascular Medicine, <sup>28</sup>Editor in Chief Arquivos Brasileiros de Cardiologia, <sup>29</sup>Editor in Chief Sydanaani (Heart Beat), <sup>30</sup>Editor in Chief Der Kardiologe, <sup>31</sup>Editor in Chief Acta Cardiologica, <sup>32</sup>Editor in Chief Heart and Blood Vessels, <sup>33</sup>Editor in Chief Revista Uruguay de Cardiologia, <sup>34</sup>Editor in Chief Korean Circulation Journal, <sup>35</sup>Editor in Chief Hjerteforum, <sup>36</sup>Editor in Chief Kardiologisk Forum, <sup>37</sup>Editor in Chief Russian Journal of Cardiology, <sup>38</sup>Editor in Chief Anatolian Journal of Cardiology, <sup>39</sup>Editor in Chief Hellenic Journal of Cardiology, <sup>40</sup>Editor in Chief Archives of the Turkish Society of Cardiology, <sup>41</sup>Editor in Chief Netherlands Heart Journal, <sup>42</sup>Editor in Chief Cardiologia Hungarica, <sup>43</sup>Editor in Chief Cardiovascular Medicine, <sup>44</sup>Editor in Chief Revista Shqiptare e Kardiologjisë, <sup>45</sup>Editor in Chief Azerbaijan Journal of Cardiology, <sup>46</sup>Editor in Chief Cardiology in Belarus, <sup>47</sup>Editor in Chief Cardiology and Internal Medicine (Georgian International Society of Cardiomyopathy), <sup>48</sup>Editor in Chief Revista Guatemalteca de cardiologia, <sup>49</sup>Editor in Chief Giornale Italiano di Cardiologia, <sup>50</sup>Editor in Chief Journal Terapevticheskiy vestnic, <sup>51</sup>Editor in Chief Revue Marocaine de Cardiologie, <sup>52</sup>Editor in Chief Slovenska kardiologija, <sup>53</sup>Editor in Chief Svensk Kardiologi, <sup>54</sup>Editor in Chief Ukrainian Journal of Cardiology

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**ALFONSO ET AL.: Authorship: From Credit to Accountability. Reflections From the Editors' Network.** *The Editors' Network of the European Society of Cardiology (ESC) provides a dynamic forum for editorial discussions and endorses the recommendations of the International Committee of Medical Journal Editors (ICMJE) to improve the scientific quality of biomedical journals. Authorship confers credit and important academic rewards. Recently, however, the ICMJE emphasized that authorship also requires responsibility and accountability. These issues are now covered by the new (fourth) criterion for authorship. Authors should agree to be accountable and ensure that questions regarding the accuracy and integrity of the entire work will be appropriately addressed. This review discusses the implications of this paradigm shift on authorship requirements with the aim of increasing awareness on good scientific and editorial practices. (J HK Coll Cardiol 2020;28:3-10)*

*Editorial ethics, Scientific process, Authorship, Accountability, Scientific journals, Journals*

## 摘要

歐洲心臟病學會（ESC）編輯網絡建立了一個動態論壇，為國際醫學期刊編輯委員會（ICMJE）作編輯討論及認可建議，從以提升生物醫學期刊的科學質量。作者身份賦予認證和重要的學術資格。然而，最近ICMJE強調作者身份需要負責任和問責。這項議題被涵蓋在新作者資格標準（第四項）。作者應同意承擔責任，並確保適當解決有關整個作品的準確性和完整性的問題。本篇評論討論了這種模式轉變對作者資格要求的影響，目的是提高對良好科學和編輯實踐的認識。

關鍵詞：編輯道德、科學過程、作者身份、問責、科學期刊、期刊

The Editors' Network of the European Society of Cardiology (ESC) is committed to fostering the implementation of high-quality editorial standards among ESC National Society Cardiovascular Journals (NSCJ).<sup>1-6</sup> NSCJ play a major role in disseminating original scientific research worldwide, but also in education and harmonisation of clinical practice.<sup>2-6</sup> Promoting editorial excellence is paramount to increasing the scientific prestige of NSCJ.<sup>1-6</sup> In this regard, the Editors' Network endorses the recommendations of the International Committee of Medical Journal Editors (ICMJE).<sup>1</sup> The ICMJE continuously updates its document on uniform requirements (previously known as the Vancouver guidelines) for manuscripts submitted to biomedical journals. These include recommendations for the conduct, reporting, editing and publication of scholarly work. Notably, vexing ethical issues are gaining increasing editorial relevance.<sup>1</sup> Biomedical research relies on trust and transparency of the scientific process where authors remain centre stage.<sup>1,7-9</sup> This review will discuss the new recommendations on authorship issued by the ICMJE<sup>1,10,11</sup> with the aim of providing further editorial insight to be progressively implemented by the NSCJ.

## New Authorship Requirements

In August 2013 an important revision of the ICMJE recommendations included a fourth criterion for authorship to emphasise each author's responsibility to stand by the integrity of the entire work.<sup>1,10,11</sup> Classically, the ICMJE requirements for authorship included: (1) substantial contributions to the conception or design of the work or the acquisition, analysis, or interpretation of data for the work; (2) drafting the work or revising it critically for important intellectual content; and, (3) final approval of the version to be published. In the updated ICMJE requirements a new (fourth) criterion also should be met.<sup>1</sup> This novel requirement for authorship includes agreement to be accountable for all aspects of the work and ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.<sup>1</sup> The essence of this new requirement is that it helps to balance credit with responsibility.<sup>10</sup> With this revision the ICMJE emphasises that authorship is a serious commitment to accountability. Now all four conditions must be met by each individual author.<sup>1</sup> The addition of a fourth criterion was motivated by situations in which some authors were unable to, or

refused to, respond to inquiries on potential scientific misconduct regarding certain aspects of the study or by denying any responsibility.<sup>1,10-14</sup> Editors occasionally face reluctant authors who try to distance themselves from a conflictive publication and shift responsibilities elsewhere.<sup>11</sup> The main novel idea is to emphasise the responsibility of each author to stand for the integrity of the entire work. Each author of a scientific paper needs to understand the full scope of the work, know which coauthors are responsible for specific contributions and have confidence in co-authors' ability and integrity.<sup>1,10-14</sup> Should questions arise regarding any aspect of a study, the onus is on all authors to investigate and ensure resolution of the issue, which is then to be presented to the corresponding Editor.<sup>1,10-14</sup> To better appraise this fourth criterion the precise meaning of responsibility and accountability should be revisited. Responsibility is defined as the moral obligation to ensure that a particular task is adequately performed.<sup>15,16</sup> Accordingly, responsibility relates to tasks that have been assigned to an individual.<sup>15,16</sup> By contrast, accountability denotes the duty to justify a given action to others and to respond for the results of that action.<sup>15,16</sup> Therefore, accountability mainly relates to the awareness and assumption of the role of being the one to blame if things go wrong.<sup>15,16</sup> Nevertheless, oftentimes responsibility is used interchangeably with accountability.<sup>15,16</sup> Claiming that each individual author is held morally responsible in every case that misconduct is detected would appear unreasonable considering the complexity of current research. Rather, the fourth criterion suggests that each author must cooperate to clarify misconduct-related issues if the paper is called into question.<sup>1,16</sup>

### **Research Credits**

Acceptance and publication of a scientific paper is always a cause of major celebration among authors.<sup>11</sup> Authorship provides prestige, credit and scientific recognition. Authorship has important academic, social and financial implications.<sup>1,11</sup> Currently, authorship remains a major criterion for promotion and career advancement among scholars. Publication records are revised in depth for university tenures and job

appointments. Total number of publications and citations remain currencies widely used to ascertain the academic value of individual investigators. In this regard, the ICMJE recommendations on authorship are intended to ensure that anybody who has made a 'substantive' intellectual contribution to a paper is given credit as an author.<sup>1</sup>

### **Potential Problems Derived from Publication of Research**

Publication of a scientific paper usually marks the end of a research project and opens a time for discussion and criticism or acceptance by the scientific community.<sup>11</sup> Occasionally, the healthy scientific debate fuelled by the publication of the paper raises serious concerns. In rare cases, even the integrity of the research or published paper is brought into question.<sup>11</sup> In these situations authors may try to escape from the embarrassment of publishing a scientifically flawed study. This explains why the new fourth criterion is so pertinent to address issues related to scientific misconduct. Should irregularities be confirmed, editors must report to the authors' academic institution and, eventually, to the readers, with expressions of concern, or, in the worst-case scenario, with a retraction of the published paper.<sup>1</sup>

### **Considerations on Classical Authorship Criteria**

Any researcher listed as an author should have made a 'substantive' intellectual contribution to the study and be prepared to take public responsibility for the work, ensure its accuracy, and be able to identify his/her contribution to the study.<sup>1</sup> However, a problem with the definition of authorship involves the subjectivity in what constitutes a 'substantial' contribution to the research or the manuscript. In fact, the precise threshold of involvement required to qualify for authorship remains unclear. As the real problem lies in defining what represents a 'substantial' contribution, means to quantify the actual work performed by

individual authors have been proposed. In this regard it has been suggested.<sup>17</sup> that substantial contribution to a publication consists of an important intellectual contribution without which a part of the work or even the entire work could not have been completed or the manuscript could not have been written.<sup>17</sup> According to the ICMJE<sup>1</sup> persons who do not qualify as an author include those who 'only' provide: (1) recruitment of patients to a trial, (2) general data collection, (3) obtaining samples for a study, (4) acquisition of funding, (5) general supervision of the research group by the department chairperson. Conversely, persons who significantly contributed to the paper but do not meet the four criteria for authorship should be listed in the acknowledgement section after obtaining their consent.

### **Publishing Individual Contributions**

The ICMJE authorship guidance is intentionally broad and open to accommodate the diversity of scientific research and allow space for the specific editorial policies of individual journals.<sup>1</sup> However, many have requested a more structured authorship framework to improve consistency and clarity in authorship requirements. The best means to present the relationship between authorship and intellectual involvement in research remains an issue of ongoing debate. Currently, the ICMJE does not mandate that all authors communicate exactly what 'contributions' qualify them to be an author.<sup>1</sup> However, unless authorship reflects to what extent individual researchers have been intellectually involved in the work it will remain misleading regarding relative research merits. Honesty and openness in attribution ensures fairness in credit. Many editors argue that authorship criteria should be revised to request a contribution declaration, in order to fully capture deserving authorship and credit. Accordingly, to promote transparency and remove ambiguity on specific contributions, editors are now strongly encouraged to develop and implement contributorship policies in their journals.<sup>1</sup> As discussed,

however, the question regarding the quality and quantity of contribution required to qualify an individual for authorship remains unresolved.<sup>1</sup> An interesting proposal in this regard suggests including contributorship badges. These badges are designed to fully capture the different types of collaboration in the submitted work that, otherwise, will be difficult to recognise with traditional credentials. Listing of contributors allows a more accurate and granular assessment of credit. In addition, this strategy provides additional insight on contributor-adjusted productivity.<sup>18</sup> Ideally, each ICMJE criterion should have at least one badge. Each badge includes a list of authors making a contribution to that specific role.<sup>18-20</sup> Others have proposed the value of assigning a numerical value to better evaluate the degree of relative contributions and, eventually, to create a contribution-specific index for each author to better assess research productivity.<sup>18-20</sup> Detailing authors' contributions informs the readers of the nature of the individual work and avoids diluting credits by precisely allocating merits. In multiauthored papers it is particularly important that authors state the specific role they played in the research. Each research project represents a significant amount of effort and, on average, the larger the number of authors the smaller percentage of effort for a given author. Other forms of contributions, not fulfilling criteria for authorship, may be recognised in the acknowledgement section or by listing these people as collaborators. This is an important issue considering the ever-increasing number of authors seen in recent publications that represents a paradigm shift resulting from team-work research.<sup>18-24</sup> Contributors credited as authors should take full responsibility and remain accountable for what is published.<sup>1,18</sup> In this regard, contribution-adjusted credits can be further weighted by other factors to derive more effective parameters for measuring research productivity. Currently, every co-author receives the exact amount of citation credit regardless of their contribution. Therefore, an 'author matrix' (including participation in ideas, work, writing and stewardship) has been proposed to 'quantify' individual contributions and roles in multi-authored papers.<sup>18-24</sup>

## By-line Location and Hierarchy

There is no adequate guidance for author sequence in the by-line. In fact, practices to clarify the relative merit of the different co-authors in a manuscript vary significantly among scientific disciplines.<sup>18-22</sup> For biomedical journals, the first author is the most important position, followed by the last author and then the second author. The first author is reserved for the person who made the largest contribution (investing most time in the project), usually the author who wrote the first draft of the paper. Then the sequence of authors tends to represent progressively lesser contributions.<sup>18</sup> Following this approach, where the sequence determines credit, the last author receives the least. Accordingly, the last position might be considered as a rather generous option. Actually, the last position is currently considered as very important in biomedical research and, in fact, it is frequently associated with the corresponding author or the guarantor of the entire work.<sup>18</sup> However, many argue that senior scientists should grab the pen (keyboard) more often, as writing remains essential for advancement in knowledge.<sup>19</sup> Senior authors have the responsibility to promote the academic career of new-generation scientists. Many journals allow authors to declare that two or more individuals have made an 'equal contribution' to the research.<sup>21,25-28</sup> In the last decade the percentage of articles with equal contribution statements has increased dramatically both in basic sciences and medical journals.<sup>25</sup> Notably, the designation of 'joint first authors' should be based on the quality and quantity of the work.<sup>21,25-28</sup> Thus the "contributed equally" designation should be reserved to honestly reflect similar scientific contributions and not to inflate a curriculum vitae.<sup>21,25-28</sup> Interestingly, the practice of listing two individuals as 'joint last author' is used less frequently but is steadily increasing. These publications should include a footnote clearly indicating that both authors contributed equally to the work.<sup>21,25-28</sup> The corresponding author takes primary responsibility for communication with the journal during the submission, peer-review, publication and post-publication periods.<sup>1</sup> Currently, most journals require contact e-mail addresses

from all listed authors who then will be contacted to inform them that the corresponding author submitted the paper. This ensures that they are aware that the paper has been submitted in their name. The systematic implementation of this electronic warning system paves the way to guarantee that the third authorship criterion has been met. Therefore, the policy now may be considered as a mere administrative requirement similar to signing a copyright transfer form. The 'guarantor' of the study may be different from the first or corresponding author and frequently is the principal investigator or most senior person in the group. The guarantor takes full responsibility for the integrity of the work as a whole from inception to the published paper. Accordingly, the guarantor must be fully prepared to defend all parts of the research project and final manuscript. Guarantors vouching for the integrity of the entire work are of special value for multi-author articles particularly when many institutions are involved. All authors should also disclose potential conflicts of interest.<sup>1,5</sup> The ICMJE uniform conflict of interest disclosure has been recently updated and all authors should complete the corresponding standardised individual electronic document.<sup>1,5</sup> In particular, authors of sponsored studies should indicate that they had full access to the data and take complete responsibility for the accuracy and integrity of the analysis. This is important as the roles and interests of different stakeholders may remain elusive or misleading in this type of study.<sup>1</sup> The subjectivity and emotionality of authorship may explain why disputes among investigators are not uncommon. Authorship disputes amongst research teams should be avoided by deciding roles and responsibilities beforehand. Ideally, the order of the authors should be collectively decided by the research team at the onset of the project.<sup>29</sup> Then, the definitive order should be revised when the work is completed, taking into account the actual level of individual contributions.<sup>17</sup> Editors are unable to judge whether authors have met the authorship criteria. The COPE (Committee on Publication Ethics; [www.publicationethics.org](http://www.publicationethics.org)) guidelines are useful to solve publication disputes.<sup>9</sup> Editors should seek explanations and the signed agreement of all authors if there is a request for a change in the author list.<sup>1</sup>

## Multi-authored Articles

Scientific collaboration has become increasingly important because the complexity of modern research involves different competencies.<sup>16</sup> Moreover, a large number of patients and centres may be required to adequately address clinically relevant questions.<sup>16</sup> In addition, multidisciplinary research groups offer the opportunity of cross-pollination.<sup>16</sup> Therefore, team-work is currently commonplace in biomedical research. Co-authorship is the most tangible result of multilateral scientific collaboration. Group (corporate) authorship has become increasingly common with variations in how individual authors and research group names are listed in the byline. Notably, citation impact is greater in papers with multiple authors coming from international cooperation. The problem of inflating publication and citation records of authors participating in multicentre studies has been a cause for concern.<sup>18</sup> This is due, at least in part, to collaboration-induced selfcitation.<sup>30</sup> Salami publications, or least publishable units strategies, are initiatives that inflate the number of publications on the same research project by dividing the work (that could have been presented in a single main paper) into smaller component parts, then publishing them as several different articles. Such strategies may be detected in some multicentre studies.<sup>30</sup> The use of co-author-adjusted citation indexes has been suggested to account for this phenomenon.<sup>30</sup> There is evidence that the number of co-authors per paper in medical literature has increased exponentially over time.<sup>22,31</sup> The reason for this increase is probably multifactorial and includes increasing complexity of research, as discussed, but also author inflation. Inappropriate authorship is not ethical and eventually leads to diminishing the value of authorship, generating a situation where undeserved coauthors cannot take responsibility for the research.<sup>22,31</sup> Interestingly, the correlation between research quality and number of authors is poor, suggesting that the component of author inflation plays a greater role than that of research complexity.<sup>31</sup> Until now the number of authors in the by-line was not considered in the evaluation of the relative academic merit of individual

authors.<sup>3</sup> However, as a research project involves a defined amount of work, the larger the number of authors in a paper the less merit any given author deserves. Major efforts are made by some individuals whereas others contribute significantly less. The credit received by people doing the work becomes diluted by the inclusion of many authors with minor, if any, contributions. Eventually this 'free lunch' strategy undermines the value of being named on a scientific paper.<sup>32</sup> Authorship guidelines should be updated to adapt to the growing trend of collaborative research. The larger the number of authors the more opportunities for contentious arguments and disputes. Every author of a 'group authorship' work must meet the four criteria for authorship. Otherwise they should be identified just as investigators or collaborators rather than authors.<sup>1</sup> Given the complexity and multiple tasks involved in current research it is clear that most authors cannot participate in every aspect of the work. Accordingly, specific responsibilities should be tied to different research roles. Authors should refrain from collaborating with colleagues whose quality or integrity may inspire concerns.<sup>1</sup> Last, but not least, with a growing number of authors it is increasingly difficult to identify those who may be held morally responsible should scientific misconduct be detected.<sup>22,31</sup> Holding everybody responsible is unfair to the researchers that are not guilty of misconduct.

## Breaches in Authorship: From Ghost to Guest Authors

Breaches in authorship are a form of deception. Guest or gift (honorary) and ghost (hidden) authors represent a form of authorship abuse that should not be permitted.<sup>33-37</sup> Ghost authorship is omitting authors that have made relevant contributions to a paper. Ghost authors provide contributions to a manuscript that do merit authorship but, for different reasons, are not included in the author byline. Some ghost authors may have major conflicts of interest or are paid by a commercial sponsor. This should be differentiated from ghost writing. Ghost writers are writing contributors to a manuscript that do not fulfil authorship criteria, but their contributions are not disclosed in the

acknowledgements.<sup>17,36</sup> Ghost writing is also an unethical practice as it keeps hidden the involvement in the manuscript. The concern is that writers hired by industry might influence the content of the publication or hide unwelcome results, which introduces potential bias that is obscured when relevant academic guest authors are accredited with authorship.<sup>17</sup> Professional medical writers should follow ethical publication practices and should openly disclose their involvement in the acknowledgement section.<sup>36</sup> The inclusion of individuals with minimal or no input reflects 'loose authorship' practices.<sup>33-37</sup> Guest, gift or honorary authorship is defined as coauthorship awarded to people who do not meet the authorship criteria and have not contributed substantially to taking public responsibility for the work.<sup>1</sup> This may be offered in the belief that the prestige of a scientifically respected person will increase the likelihood of publication or the impact of the work.<sup>29</sup> Oftentimes, a well-known academic senior name is used to conceal ghost authors with industry-related conflicts of interest.<sup>29</sup> Both the gift author and the remaining co-authors may benefit from this practice (a win-win situation) that, nevertheless, remains unethical. The increased pressure to publish among scholars seeking promotion and career advancement (the "publish or perish" culture) may also help to explain these practices. This pressure explains why some researchers accept 'gift' authorship in papers to which they have not contributed intellectually. This abuse in authorship devalues the merit of being named as an author in a scientific paper. As previously discussed, quantitative contribution helps to prevent granting undeserved credits to guest authors who take away well-deserved credits from the authors who actually did the work.<sup>37-40</sup> Studies suggest that breaches of authorship guidelines are frequent. In a recent survey one-third of authors believed that they had been excluded from deserved authorship and a similar number declared that they had experienced pressure to include undeserved authors in their papers.<sup>20</sup> Another recent study of journals included in the Journals Citation Reports database suggested that 85% of them included in their policy guidance the requirement that authors should be accountable for the research as a whole, 32% explicitly prohibited guest or ghost authorship, but only 5% required authors to describe their individual contributions.<sup>25</sup>

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**Author Contribution:** Authorship confers credit but also involves responsibility. Authors should be accountable and vouch for the integrity of the entire work. The Editors' Network of the ESC endorses the ICMJE recommendations on authorship and encourages individual NSCJ to adapt their editorial policies accordingly.

**Conflict of Interest:** F. Alfonso and Editors' Network and European Society of Cardiology (ESC) Task Force declare that they have no competing interests.

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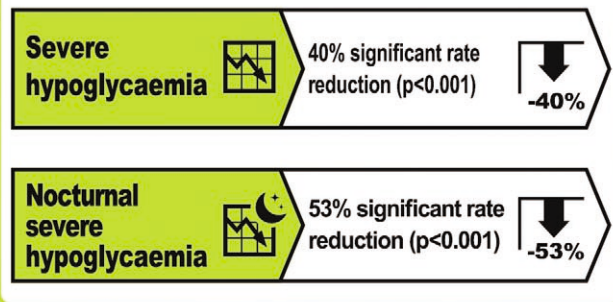
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In children care should be taken to match insulin doses (especially in basal bolus regimens) with food intake and physical activities in order to minimize the risk of hypoglycaemia. Reduction of warning symptoms of hypoglycaemia may be seen upon tightening control and also in patients with long-standing diabetes. Administration of rapid acting insulin is recommended in situations with severe hyperglycaemia. Inadequate dosing and/or discontinuation of treatment in patients requiring insulin may lead to hyperglycaemia and potentially to diabetic ketoacidosis. Concomitant illness, especially infections, may lead to hyperglycaemia and thereby cause an increased insulin requirement. Transferring to a new type, brand or manufacturer of insulin should be done under medical supervision and may result in a change in dosage. When using insulin in combination with pioglitazone, patients should be observed for signs and symptoms of heart failure, weight gain and oedema. Pioglitazone should be discontinued if any deterioration in cardiac symptoms occurs. Patients must be instructed to always check the insulin label before each injection to avoid accidental mix-ups between the two strengths of Tresiba® and other insulins. Hypoglycaemia may constitute a risk when driving or operating machinery. Pregnancy and lactation: There is no clinical experience with use of Tresiba® in pregnant women and during breastfeeding. Animal reproduction studies have not revealed any difference between insulin degludec and human insulin regarding embryotoxicity and teratogenicity. Undesirable effects: Refer to SmPC for complete information on side effects. Very common (≥1/10); common (≥1/100 to < 1/10); uncommon (≥1/1,000 to < 1/100); rare (≥1/10,000 to < 1/1,000); very rare (< 1/10,000); not known (cannot be estimated from the available data). Very common: Hypoglycaemia. Common: Injection site reactions. Uncommon: Lipodystrophy and peripheral oedema. 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## Organizing Committee

Chairman	:	Ngai-yin Chan
Advisors	:	Chung-seung Chiang Patrick TH Ko Yuk-kong Lau
Co-chairs	:	Carmen WS Chan Kin-lam Tsui Bryan PY Yan
Committee Members	:	William CK Chan Jason LK Chan Andy WK Chan Raymond CY Fung Kwok-lun Lee David KY Lo Kin-shing Lun Thomas Tunggal Ka-lam Wong

# Scientific Programme

## Friday, 3 July 2020

0900-1030	<b>Oral Abstracts Presentation</b> <b>Chairperson:</b> Ngai-yin Chan <b>Judges:</b> Joseph YS Chan, Ngai-yin Chan, Suet-ting Lau	
	Risk of ventricular arrhythmia in improved left ventricular ejection fraction in implantable cardioverter-defibrillator for primary prevention	Tai-chung So
	Total aortic arch replacement and frozen elephant trunk: mid term and second stage surgery outcomes	Jacky YK Ho
	What demographic factors influence participation in a randomised controlled trial on prehabilitation for cardiac surgery?	Derek KW Yau
	Effect of Homocysteine on the KCa channel Family in Human Internal Mammary Artery	Wen-tao Sun
	Influenza Activity and ST-segment Elevation Myocardial Infarction Incidence in Hong Kong	Joyce Shek
	Long term survival of one hundred left ventricular assist device recipients in Hong Kong	Ka-lam Wong
	Early clinical experience with the rapid deployment Intuity valve for surgical aortic valve replacement	Kevin Lim
	Alteration of Plasma Concentration of Trace Elements Selenium and Cobalt During and After Coronary Artery Bypass Grafting Surgery	Jia-yi Zhou
	Endovascular treatment for traumatic aortic transection: 13 years experience of a single center	Jacky YK Ho
1030-1100	Break	
1100-1230	<b>Best Abstracts Presentation</b> <b>Chairpersons:</b> Ngai-yin Chan, Suet-ting Lau <b>Judges:</b> Chun-ho Cheng, Ngai-shing Mok, Bryan PY Yan	
	Prognostic Value of Hepatorenal Function by Modified Model for End-stage Liver Disease (MELD) Score in Patients Undergoing Double Valve Replacement	Yu-juan Yu
	Role of Adipocyte Fatty Acid-Binding Protein in LV remodeling and Diastolic Function in Type 2 Diabetes: A Prospective Echocardiography Study	Mei-zhen Wu
	The prevalence and prognosis of tricuspid regurgitation in stage A to C heart failure with preserved ejection fraction	Qing-wen Ren
	Inhibition of IRE1 branch of ER Stress Ameliorates Myocardial Ischemia/Reperfusion Injury via Inactivation of sEH and JNK/c-Jun pathway	Hong-mei Xue
	Prolonged Valsartan Use And Cancer Risk	Tak-hon Chan
	The Impact of Metabolic Syndrome on Air Pollution (PM2.5)-related Atherogenesis in Modernizing China: A report from CATHAY Study	Kam-sang Woo
1230-1300	Lunch Break	
1300-1500	<b>Guidelines and Practice: Clinical Case Based Conference (GAP-CCBC) – Session 1</b> <b>Chairpersons:</b> 楊躍進、常敏之、蔣忠想、林如波、王焱、徐亞偉	
	Case Series: Volume-Controlled Revascularization in patients with AMI during Primary PCI 系列病例报道之：接受急诊PCI治疗的AMI患者在再血管化治疗过程中的容量控制	Ji-Fang He 何冀芳
	An 80-year lady, fever, anaemia for 2 months 80岁年老女病人，发热贫血2月	Yan Wang 王焱
	Management of an acute myocardial infarction patient with much thrombus burden: a case report	Chun-chih Chiu 邱淳志
	Successful retrieval of entrapped rotablator after failure of traditional method	Andrew YW Li
	Who is the murderer of the twins with acute myocardial infarction simultaneously? 寻找孪生子同患急性心肌梗死的真凶	Ya-Lei Han 韩雅蕾
	Proximal radial artery recanalization and left main coronary artery intervention through distal radial artery route: A case report 病例报告：近端桡动脉再通及左主干冠状动脉经远端桡动脉途径干预	Ren-Rong Wang 王仁荣

- 1500-1700 **Guidelines and Practice: Clinical Case Based Conference (GAP-CCBC) – Session 2**  
**Chairpersons:** 盧長林、殷偉賢、李惟銘、楊進剛、何冀芳、徐健霖
- Complaint of chest pain with dyspnoea: difference patients with different diagnosis  
胸痛合併呼吸困難：相同的主訴不同的診斷 Zheng Wang  
王征
- Case report: Revascularization of CTO in LAD by Real-time IVUS guiding  
IVUS實時指導開通前降支CTO病變一例 Zhi-Yong Zhang  
張智勇
- Case Report of cardiac sarcoidosis – A silent killer behind Dilate Cardiomyopathy  
Chang Tou
- A case of acute myocardial infarction caused by coronary embolism in an elderly woman  
老年女性冠脈栓塞致急性心肌梗死一例 Yan-Fei Qiu  
邱豔菲
- OCT-derived fractional flow reserve during on site coronary angiography  
Li-wei Chen  
陳立威
- 1700-1830 **Heart Team Symposium: A Case-based Approach**  
**Chairpersons:** Alex PW Lee, Michael KY Lee, Randolph HL Wong  
**Panelists:** Daniel TL Chan, Ka-lung Chui, Shing-fung Chui, Vincent WS Ng
- Heart team in actions: Managing complex TAVI procedures  
Michael KY Lee  
TMVRepair toolbox: clip, chord, ring, or hybrid? Simon CC Lam  
Yat-yin Lam  
Transcatheter therapies for tricuspid regurgitation Song Wan  
Heart team's journey over the past decade: A mitral surgeon's perspective  
Panel Discussion
- Saturday, 4 July 2020**
- 0830-1030 **Atrial Fibrillation & Antithrombotic Symposium**  
**Chairpersons:** Kai-fat Tse, Thomas Tunggal
- Antithrombotic treatment in coronary artery disease and peripheral artery disease:  
latest update and clinical implication Dominick Angiolillo
- Use of NOAC in vulnerable patients with atrial fibrillation  
Hung-fat Tse  
Strategy and optimized workflow for AF ablation Song-wen Chen  
Simon CC Lam  
Device design dictates closure success – Watchman FLX and other new generation  
LAAO devices
- 0900-1000 **Heart Rhythm Symposium I: Minimizing fluoroscopy and optimizing outcomes**  
**Chairpersons:** Hau-kwong Chung, Ming-ho Wong
- Use of 3D mapping system in CIED implantation  
Ngai-yin Chan  
Use of intracardiac echocardiography in EP procedures Mansour Razminia
- 1030-1100 Break
- 1100-1230 **Heart Rhythm Symposium II**  
**Chairpersons:** Jacky K Chan, Ngai-shing Mok
- S-ICD: Can it be the first choice in prevention of sudden cardiac arrest?  
Jo Jo SH Hai  
Leadless cardiac pacing for patients with atrioventricular block Jo Jo SH Hai  
ECG interpretation and treatment options for PVC and VT Hui-nam Pak
- 1230-1400 **Lunchtime Symposium: Paradigm Shift in Cardiology**  
**Chairpersons:** Vincent OH Kwok, Chris KY Wong
- SGLT2 Inhibition: New addition to the anti-heart failure armamentarium  
Subodh Verma  
Individualizing antiplatelet therapy in patients with chronic coronary syndrome Marc P. Bonaca
- 1400-1415 Break
- 1415-1430 **Opening Ceremony & Award Announcement**

- 1430-1500 **Hong Kong Heart Foundation Lecture**  
**Chairperson:** Chu-pak Lau  
 Finding the silent danger: Who, when and how for AF screening? Ngai-yin Chan
- 1500-1530 Break
- 1530-1730 **ESC@HKCC ASC: Echocardiography and Valvular Heart Disease**  
**Chairpersons:** Eric CY Wong, Li-wah Tam  
 How to assess tricuspid regurgitation in light of new prognostic information? Jose Luis Zamorano  
 State-of-the-art 3D echocardiography for structural heart intervention Alex PW Lee  
 Imaging in atrial fibrillation Jeroen J. Bax  
 Low flow low gradient Aortic stenosis - challenges in diagnosis and management Eric CY Wong
- 1730-1900 **Coronary Ischaemia Symposium**  
**Chairpersons:** Yu-ho Chan, Man-chun Choi, Kwok-lun Lee, Peter CY Wong  
 Update on the management of chronic stable angina Cheuk-man Yu  
 Can we stabilize and even regress the atherosclerotic plaque? Going beyond statin! Peter J. Lansberg  
 How to optimize PCI outcome? Ho Lam

## Sunday, 5 July 2020

- 0800-0915 **KSC@HKCC ASC: Management of Coronary artery disease: From cardiac imaging to coronary imaging and physiology**  
**Chairpersons:** Carmen WS Chan, Ping-tim Tsui  
 Coronary imaging and physiology Bon-Kwon Koo  
 My collection of IVUS and OCT cases: Lessons to learn Ping-tim Tsui  
 Cardiac imaging Yeonyee E Yoon
- 0915-1030 **ACC@HKCC ASC: Hope and challenge in cardiovascular medicine**  
**Chairpersons:** Chun-ho Cheng, Yuk-kong Lau  
 Cardiac Care in Women: a US Perspective Dipti Itchhaporia  
 Cardiovascular benefits of antidiabetic drugs – have we reached a conclusion? Bernard MY Cheung  
 Cardio-oncology in 2020 – opportunities and challenges Richard Kovacs
- 1030-1100 Break
- 1100-1200 **Heart Failure Symposium**  
**Chairpersons:** Gary SH Cheung, Godwin TC Leung  
 Reverse remodeling in heart failure – how can we achieve that? James Januzzi  
 Biomarkers in the treatment of heart failure James Januzzi
- 1200-1230 Break
- 1230-1330 **Lunchtime Symposium**  
**Chairperson:** Kathy LF Lee  
 PCSK9 inhibition: How to apply in lipid management? Hung-fat Tse
- 1330-1530 **Best Challenging/Interesting Cardiac Intervention Cases Presentation**  
**Chairperson:** Shu-kin Li  
**Judges:** Kam-tim Chan, William CK Chan, Stephen WL Lee  
 Left bundle branch pacing as a physiological pacing alternative to cardiac resynchronization therapy in patients with heart failure and left bundle branch block Kit Chan  
 A Case of Percutaneous Mitral Valve Repair In Acute Mitral Regurgitation Following Myocardial Infarction Calvin Leung  
 Reperfusion Injury Prevention, A Volume-Controlled Reperfusion Method in Acute Coronary Artery Occlusion Ji-fang He

	Strange bedfellows	Daniel HF Fong
	Double patch post-infarction ventricular septal rupture repair with infarct exclusion for inferoposterior myocardial infarction	Joyce WY Chan
	The First Case of Impella RP use in Acute Right Ventricular Failure from Air Embolism	Yaser Khalid
1530-1600	Break	
1600-1800	<b>Best HKCC-HKPHCA Challenging/Interesting Clinical Cardiology Cases Presentation</b>	
	<b>Chairperson:</b> Ngai-yin Chan	
	<b>Judges:</b> Kam-tim Chan, Raymond CY Fung, Kin-lam Tsui	
	Massive pulmonary embolism successfully resuscitated by E-CPR and percutaneous thrombectomy	Shek-yin Au
	Polymorphic Ventricular Tachycardia in a Patient with High Dose Methadone Use	Weng-chio Tam
	Case report of successful peripheral VA ECMO in a patient with chronic type B aortic dissection	Shek-yin Au
	First marginal heart transplantation utilizing organ care system in Asia	Ka-lam Wong
	Another Simple Pericarditis?	Yue-hin Tang
	A Case of the Novel Coronavirus (COVID-19)-induced Myocarditis and Takotsubo Cardiomyopathy	Yaser Khalid
1800-1810	<b>Closing Remark &amp; Award Announcement</b>	Ngai-yin Chan

*\*The program is subject to change without prior notice.*

## Paediatric Cardiology Program

**Saturday, 4 July 2020**

0830-1025	<b>Free Paper Session (Abstract &amp; Interesting Cases presentation)</b>	
	<b>Award presentation</b>	
	<b>Assessor &amp; Chairpersons:</b> Robin HS Chen, Maria SH Lee	
	<b>Judges:</b> Eddie WY Cheung, Yiu-fai Cheung, Maurice P Leung, Sabrina SL Tsao	
	Clinical Application of Fetal Pulmonary Valvuloplasty for Pulmonary Atresia with Intact Ventricular Septum with Worsening Right Ventricular Hypoplasia: Combined with Postnatal Outcomes	Si-lin Pan
	Thrombocytopenia Associated with Transcatheter Closure of Giant Patent Ductus Arteriosus	Lei Liu
	Attenuation of cardiomyocyte hypertrophy via depletion Myh7 using CASA AV gene therapy prevents and reverses heart failure in a murine knockout model of Barth syndrome	Pang Yue Yi-fei Li
	Paediatric Myopericarditis - A Single Regional Hospital Experience	Ka-shing Chung
	Pacing Therapy in Infants with Congenital Complete Heart Block in Hong Kong	Sit-yee Kwok
	Genetic Spectrum of Paediatric Cardiomyopathy in Hong Kong	Zhou Julia Shi
	Double balloon dilation of pulmonary arterial bifurcation stenosis after previous surgical palliations: a case report	Shu-liang Xia
	Life-threatening Flecainide Toxicity related to Alteration of Milk Feeding in an Infant	Zhou Julia Shi
	Successful resynchronization therapy for an infant with dilated cardiomyopathy	Sit-yee Kwok
1025-1030	<b>Welcome Address</b>	Tak-cheung Yung
1030-1130	<b>Paediatric Cardiology Symposium I</b>	
	<b>Chairpersons:</b> Grace KS Lam, Nai-chung Fong	
	Prevention and reduction of cardiotoxicity in childhood cancer therapy	Grace PY Tong
	Cardiac assessment and monitoring in Paediatric oncology patients and survivors	Yiu-fai Cheung
1130-1145	Break	

1145-1245	Cardiac magnetic resonance assessment in oncology patients Management of cardiotoxicity in childhood cancer patients	Carmen WS Chan Sit-yeek Kwok
1245-1400	Lunch Break	
1400-1500	<b>Paediatric Cardiology Symposium II</b> <b>Chairpersons:</b> Dennis TL Ku, Dora ML Wong Extracorporeal life support in critical ill paediatric cancer patients Heart transplantation in adult cancer survivors with end stage heart failure	Robin HS Chen Ka-lam Wong
1500-1515	Break	
1515-1615	Interesting cases sharing and discussion - by oncologist Interesting cases sharing and discussion - by cardiologist	Calvin PL Hoo Julia Shi
1615-1620	Closing Remark	Dennis TL Ku Kin-shing Lun

*\*The program is subject to change without prior notice*

## **Allied Cardiovascular Health Professional Symposium** New "Tools and Toys" in Cardiac Catheterization Laboratory

**Saturday, 4 July 2020**

**Session 1 Chairpersons:** Jackie SL Kan, Chiu-sun Yue

1000-1025	His-Purkinjee System Pacing	Ho-chuen Yuen
1025-1050	Impella Nursing Care	Chung-on Mak
1050-1120	Break	

**Session 2 Chairpersons:** Wing-yeek Kwan, David KY Lo, Thomas KS Wong

1120-1145	Wound Care in Interventional Cardiology	Wing-si Wong
1145-1210	New Tools for Calcified Coronary Lesions Part I: Intravascular Shock Wave Lithotripsy	Frankie CC Tam
1210-1235	New Tools for Calcified Coronary Lesions Part II: Coronary Orbital Atherectomy System	Shing-fung Chui



# Cardiology Course for Family Physicians and General Practitioners

Sunday, 5 July 2020

## **Preventive Cardiology: Expanding the Role of Primary Care Physician in Cardiology**

**Chairpersons:** Chi-wo Chan, Nim-pong Kwong, Kin-keung Tsang

0900-0930	Beyond HbA1c: preventing cardiac and renal complications in diabetic patients	Subodh Verma
0930-1000	Emerging role of NOAC in the treatment of CAD & PAD	Frankie CC Tam
1000-1030	Peripheral arterial disease in primary care: reasons why you should care	Bryan PY Yan
1030-1100	Break	

## **Cardiology Updates: What a Primary Care Physician Needs to Know in 2020**

**Chairpersons:** Chun-leung Lau, Albert WS Leung, Yui-chi So

1100-1130	New era for heart failure management	Katherine YY Fan
1130-1200	Appropriate treatment of clinical and subclinical atrial fibrillation	Jacky K Chan
1200-1230	New concepts in the management of angina	Duncan HK Ho
1230-1400	Lunch Break	

## **Cardiology Issues in Women & Paediatrics**

**Chairpersons:** Ronnie HL Chan, Kin-Shing Lun

1400-1430	Pregnancy and cardiac disease	Pak-cheong Chow
1430-1500	Common Paediatric arrhythmia for primary care physician	Sabrina SL Tsao
1500-1530	Update on Paediatric Hypertension Guidelines	Nai-chung Fong
1530-1600	Break	

## **Common Cardiology Challenges in Primary Care**

**Chairpersons:** Alan KC Chan, Ho Lam

1600-1630	How to achieve maximally tolerated statin therapy for maximum protection	Bernard BL Wong
1630-1700	Strategies for better BP control and outcomes in hypertensive patients	Bernard MY Cheung
1700-1730	Managing heart failure and co-morbidities in primary care	Elaine MC Chau

*\*The program is subject to change without prior notice*

ABSTRACTS

ORAL ABSTRACTS PRESENTATION

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**Risk of Ventricular Arrhythmia in Improved Left Ventricular Ejection Fraction in Implantable Cardioverter-defibrillator for Primary Prevention**

TC So

Queen Elizabeth Hospital, Hong Kong

**Background:** About one-third of patients with ICD for primary prevention had their LVEF improved to >35% in follow-up. The risk of ventricular arrhythmia in this group of patients is unknown.

**Methods:** This is a retrospective, single centre study. Patients implanted ICD/CRT-D for primary prevention from 2007-2018 were recruited, LVEF were assessed by ECHO at least 1 year later. Patients were divided into 2 groups by their follow up LVEF, i.e. LVEF >35% or LVEF < or =35%. Occurrence of VT/VF was defined by documented ventricular arrhythmia. Primary outcome is the occurrence of VT/VF. Survival analysis was done with Kaplan-Meier survival analysis and Cox proportional hazard model.

**Results:** 47 patients were included and 12 patients developed VT/VF in follow up, accounting up to 25.5% of total patients. 23% (n=11) had the LVEF improved to >35%, of which 9% (n=1) developed VT/VF. 77% (n=36) had the LVEF < or = 35%, of which 30% (n=11) developed VT/VF. Kaplan-Meier survival analysis showed no significant difference in occurrence of VT/VF (Log rank test, p=0.15). In the Cox model comparing patients with improved LVEF to those with LVEF < or =35%, the hazard ratio was 0.28 (p=0.186) for occurrence of VT/VF.

**Conclusion:** In heart failure patients with ICD implanted as primary prevention, the risk of VT/VF persisted even after improvement of LVEF to >35%, the risk may be reduced but not eliminated.

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**Total Aortic Arch Replacement and Frozen Elephant Trunk: Mid Term and Second Stage Surgery Outcomes**

JYK Ho, SCY Chow, MWT Kwok, T Fujikawa, M Underwood, RHL Wong

Division of Cardiothoracic Surgery, Department of Surgery, Prince of Wales Hospital, Hong Kong

**Background:** Aortic arch pathologies is a surgical challenge, involving cerebral, visceral and myocardial protection. Total arch replacement and frozen elephant trunk (TAR FET) had been evolved with promising mid-term outcome in Europe. We evaluated our mid-term outcome on TAR FET and the second staged descending aortic intervention.

**Methods:** Between August 2014 and April 2020, 41 patients with aortic arch pathologies underwent TAR FET implant with Thoraflex-Hybrid-Plexus device (Vascutek, Inchinnan, Scotland). Patients' perioperative, clinical and radiological outcomes were reviewed.

**Results:** Post discharge survival (n=37) at 1 and 3 year were 100%. Overall survival of 87.8% over a median follow up of 3.3 years, inpatient mortality of 9.7%. Distribution of aortic pathologies with acute Type A dissection or intramural hematoma (n=15, 36.6%), thoracic aortic aneurysm, including arch and descending aortic aneurysm (n=9, 22%) and chronic aortic dissection including chronic type A and type B dissections (n=13, 31.7%). Mean operative, circulatory arrest and antegrade cerebral perfusion time were 417±121 min, 89±28 min and 154±43 min respectively. Second stage procedures were performed in 32% and distal stent graft induced new entry (dSINE) was observed in 19% of patients.

**Conclusion:** We reported our mid term Thoraflex TAR FET with outcomes, and the results from descending aortic pathologies second stage treatments. Arterial cannulation site and time of antegrade cerebral protection were not clinically reflected for risk of stroke or mortality. The observation of aortic remodeling and dSINE requires further investigations.

## ABSTRACTS

## ORAL ABSTRACTS PRESENTATION

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**What Demographic Factors Influence Participation in a Randomised Controlled Trial on Prehabilitation for Cardiac Surgery?**DKW Yau,<sup>1,3</sup> MJ Underwood,<sup>2</sup> GM Joynt,<sup>1,3</sup> A Lee<sup>1</sup><sup>1</sup>Department of Anaesthesia and Intensive Care, The Chinese University of Hong Kong; <sup>2</sup>Division of Cardiothoracic Surgery, Department of Surgery, The Chinese University of Hong Kong; <sup>3</sup>Department of Anaesthesia and Intensive Care, Prince of Wales Hospital, Hong Kong**Background:** The ongoing PREQUEL study examines the effect of a hospital-based physical prehabilitation program before cardiac surgery to improve frailty and hence postoperative recovery. The objective of this sub-study was to assess the association between baseline factors and successful study participation.**Methods:** This is a stratified RCT (ChiCTR1800016098) at a university hospital in Hong Kong. 153 pre-frail and frail patients (Clinical Frailty Scale [CFS] 4-6) who met the eligibility criteria were invited to participate in the trial between July 2018 and March 2020. Non-participants were defined as: inability to regularly attend, or indecisive/refusal to participate. Mobility status was classified as good (independent outdoor walker) or poor (homebound). Driving distance from home to hospital was estimated using Google Maps software. Demographic and baseline clinical data differences between participation groups were analysed using appropriate univariate tests.**Results:** There were 81 (52.9%) participants and 72 (47.1%) non-participants during the 21-month period. Study participation groups were similar for mean age (P=0.29), gender (P=0.58), occupation (P=0.27), education level (P=0.84), living alone (P=0.44), regular exercise habits (P=0.24), types of surgery (P=0.73), median frailty level (P=0.42), median left ventricular ejection fraction (P=0.75) and median number of cardiovascular risk factors (P=0.11). Poor mobility status was associated with the study participation, with no homebound participants recruited into the study (P=0.047). Participation rates varied across districts (33-100%), with 3 patients living across the border. For Hong Kong-based patients, study participants lived closer to the hospital than non-participants (n=150; median [IQR]: 21.8 km [7.5-32.0 km] vs 30.4 km [13.3-34.8 km]; P=0.02). Patients who lived ≤20 km of the hospital were more likely to participate in RCT than those living >20 km away (RR: 1.49, 95% CI: 1.12-1.99).**Conclusion:** Good mobility status and closer residential distance from the hospital were associated with successful RCT participation. Recruitment strategies that address ambulatory and transport difficulties may increase the participation of patients living far away from the hospital.

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**Effect of Homocysteine on the KCa Channel Family in Human Internal Mammary Artery**

WT Sun, HM Xue, HT Hou, HX Chen, J Wang, GW He, Q Yang

Center for Basic Medical Research &amp; Department of Cardiovascular Surgery, TEDA International Cardiovascular Hospital, Chinese Academy of Medical Sciences &amp; Peking Union Medical College, Tianjin, China

**Background:** We recently clarified the expression and distribution profile of the calcium-activated potassium (KCa) channel family, including large-, intermediate-, and small conductance KCa (BKCa, IKCa, SKCa) subtypes in the grafts for coronary artery bypass surgery (CABG) including internal mammary artery (IMA). This study further investigated the effect of homocysteine, an independent risk factor for atherosclerotic vascular disease, on the expression and functionality of the KCa channel family in IMA.**Methods:** Residual IMA segments were obtained from patients undergoing CABG. The role of KCa subtypes in vasorelaxation and vasoconstriction and the effect of homocysteine were studied in a wire myograph. Western blot and immunohistochemistry were performed to determine the effect of homocysteine on the expression and distribution of KCa subtypes.**Results:** Blockade of the BKCa subtype significantly suppressed acetylcholine-induced relaxation and enhanced U46619-induced contraction. In comparison, blockade of IKCa or SKCa subtypes individually or jointly barely affected the relaxation and contraction of IMA. Homocysteine exposure compromised the vasodilating activity of the BKCa subtype in IMA, evidenced by the suppressed relaxant response to the BKCa channel opener and the diminished effect of the BKCa channel blocker on acetylcholine-induced relaxation and U46619-evoked contraction. The loss of BKCa channel function was associated with a lowered protein level of BKCa β1 subunits in the smooth muscle of IMA. Homocysteine potentiated the role of IKCa and SKCa subtypes in mediating endothelium-dependent relaxation without affecting the expression of these channels.**Conclusions:** The BKCa subtype in the KCa channel family plays a significant role in the regulation of the tone of the IMA. Homocysteine causes loss of BKCa β1 subunits in the smooth muscle of IMA, resulting in compromised vasodilating activity of the BKCa channel. IKCa and SKCa subtypes are unessential for IMA vasoregulation, whereas the loss of BKCa channel function in hyperhomocysteinemic condition enhances the role of IKCa and SKCa subtypes in mediating endothelial dilator function. We suggest that targeting BKCa channels may form a strategy to improve the postoperative graft performance in CABG patients with hyperhomocysteinemia who receives IMA grafting.

ABSTRACTS

ORAL ABSTRACTS PRESENTATION

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**Influenza Activity and ST-segment Elevation Myocardial Infarction Incidence in Hong Kong**

J Shek, PT Tsui, TY Tsang, CY Fung, HC Yuen, NS Mok, NY Chan  
Princess Margaret Hospital, Hong Kong

**Background:** Influenza or acute myocardial infarction (AMI) is seasonal with usual upsurge in winter months. Influenza might be a trigger of AMI. The outbreak of COVID-19 in China led to population wide masking, practice of hand hygiene and social distancing in Hong Kong starting from late January 2020.

**Methods:** Our study aimed to look at the relationship between influenza activity and ST-segment elevation myocardial infarction (STEMI) incidence as well as the epidemiological impact of universal infection control measures. Patients with a diagnosis of acute STEMI from January 2014 to March 2020 were retrieved from the Hospital Authority Clinical Data Analysis and Reporting System. We also downloaded data of influenza activity and air pollution from Centre for Health Protection and Environmental Protection Department respectively.

**Results:** With few exceptions, the STEMI incidence per standardized month basically mirrored the influenza activity from 2014 to 2020. During the winter of 2014-15, 2015-16, 2017-18 and 2018-19, the number of STEMI cases went up with the influenza activity. The rise in the number of STEMI cases in December 2016 and January 2017 was not obvious mirroring the inconspicuous rise in influenza activity of the same period. The surge of influenza during the summer of 2015 and 2017 was not accompanied by an increase in the number of STEMI cases. Influenza activity is a predictor of STEMI incidence after adjusting for air pollution and time factors. We observed an abbreviated peak and narrow base of the influenza activity curve for the winter of 2019-20. The number of STEMI cases rose to 220 in December 2019 but then dropped significantly from January to March 2020 mimicking the influenza activity curve.

**Conclusion:** Our observation agrees with the hypothesis of AMI triggered by influenza infection and cold weather. Furthermore, population wide infection control measures during the COVID-19 pandemic might have contained influenza activity and possibly reduced the population risk of STEMI.

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**Long Term Survival of One Hundred Left Ventricular Assist Device Recipients in Hong Kong**

KL Wong,<sup>1</sup> K Fan,<sup>1</sup> C Ho,<sup>2</sup> OJ Lee,<sup>2</sup> T Au<sup>2</sup>

<sup>1</sup>Grantham Hospital; <sup>2</sup>Queen Mary Hospital, Hong Kong

**Background:** Therapeutic options for end stage heart failure remained limited and limited donor supply remained the Achilles heel for heart transplantation. With advancement in technology, left ventricular assist device (LVAD) had been increasingly used both as bridge to transplantation, bridge to decision as well as destination therapy. We aimed to review the long-term survival of one hundred LVAD recipients in Hong Kong.

**Method:** All the 100 patients who received LVAD therapy since the start of the LVAD program in 2010 until December 2019 were included. Survival were analyzed by Kaplan Meier analysis and compared by Log-rank test.

**Results:** During the study period a total of 100 patients received LVAD therapy (84% Male, mean age 48.4 years old). There were 88 patients received LVAD as bridge to transplantation (BTT) or bridge to candidacy (BTC) as initial strategy and 25 had subsequent heart transplantation. The remaining 12 patients received LVAD as destination therapy. Overall survival was 85.8%, 80.7% and 70.9% at 1-year, 2-year and 4-year respectively as compared to benchmark survival of 81%, 70% and 49% at 1-year, 2-year and 4-year respectively in the INTERMACS registry. There was no significant difference in post-transplant survival between recipients with and without prior durable LVAD.

**Conclusion:** While heart transplantation remained gold standard treatment for patients with advanced heart failure with good long-term outcome, the rapid advancement in durable mechanical circulatory support also provides another therapeutic option for patients with stage heart failure.

## ABSTRACTS

## ORAL ABSTRACTS PRESENTATION

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**Early Clinical Experience with the Rapid Deployment Intuity Valve for Surgical Aortic Valve Replacement**

K Lim, SCY Chow, J Ho, RHL Wong  
Prince of Wales Hospital, Hong Kong

**Background:** Sutureless or rapid deployment valves is an appealing alternative to traditional sutured valves for complex open, redo and minimally invasive operations, with the potential to reduce crossclamp and cardiopulmonary bypass times.

**Methods:** The Edwards Intuity valve consists of a standard Perimount Magna Ease pericardial valve mounted on a balloon-expandable stainless steel skirt. After placing three guiding sutures through the sewing cuff and proper seating of the valve at the annular plane, a balloon is inflated to anchor the metallic frame at the left ventricular outflow tract.

A retrospective review was conducted on all consecutive patients who received the Intuity valve at the Prince of Wales Hospital. Demographical, clinical, echocardiographic and procedural data were extracted from the Hospital Authority electronic patient records and analysed using SPSS 23.0.

**Results:** Eighteen valves in total were deployed at our institution from August 2018 to May 2020. The median duration of follow-up was 10 months. Fourteen valves were implanted via median sternotomy, three via hemisternotomy and one via right mini-thoracotomy. All deployments were successful at the first attempt.

61% (n=11) of the cohort were male. The median age was 69, ranging from 58 to 85. All patients had severe aortic stenosis with preserved left ventricular ejection fraction (over 50%). Two patients (11.1%) had true bicuspid valves. 22% patients (n=4) had concomitant CABG. Two had a concomitant ascending aortic replacement and another two patients had a concomitant mitral valve operation. One required root enlargement to fit the Intuity valve. One patient underwent redo SAVR with the Intuity valve for paravalvular leak in the explanted metallic valve.

One patient who underwent isolated SAVR died from multiorgan failure. One required resternotomy for haemostasis. Crossclamp and bypass times for SAVR via median sternotomy was 60.8±14.9 minutes and 99.7±29.4 minutes respectively.

Two patients required permanent pacemaker insertion due to complete heart block.

In terms of haemodynamic performance, mean transvalvular gradient was measured in fifteen patients and averaged 7.33±3.18 mmHg. Paravalvular leak was absent or trivial in all but one patient. That patient with moderate PVL had underlying Behçet's aortitis.

**Conclusion:** Implantation of the Edwards INTUITY Valve System is safe, efficient and the results are highly reproducible even in challenging scenarios.

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**Alteration of Plasma Concentration of Trace Elements Selenium and Cobalt During and After Coronary Artery Bypass Grafting Surgery**

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**Purpose:** Trace elements including selenium (Se) and cobalt (Co) have been known to be essential in the human body and are involved in the development of arteriosclerosis and coronary artery disease. The present study was designed to investigate the effect of cardiopulmonary bypass (CPB) and CABG surgery on the plasma Se and Co during and after CABG.

**Methods:** From December 2019 to January 2020, preoperative plasma samples from isolated first-time CABG patients (N=20; 10 males and 10 females) were prospectively collected. The blood sample was collected at five points: after anesthesia and before CPB (T1), 45 min after CPB (T2), 90 min after CPB (T3), postoperative day1 (T4), and day 4 (T5), respectively. The upper plasma was used for study. After CABG, according to the heart

rhythm, the patients were also grouped to postoperative atrial fibrillation (POAF+) and sinus rhythm (POAF-).

**Results:** The concentration significantly decrease for Se at T2 (105.24±4.08 vs. 68.56±2.42 µg/L, P<0.001) and T3 (105.24±4.08 vs. 80.41±3.40 µg/L, P<0.001) and for Co at T4 (0.35±0.19 vs. 0.26±0.13 µg/L, P<0.001) and T5 (0.35±0.19 vs. 0.23±0.11 µg/L, P<0.001). Five patients developed POAF. However, there was no significant correlation between POAF(+) and POAF(-) groups, probably due to small sample size.

**Conclusion:** This study for the first time identified the alteration of plasma concentration of Se and Co during and after CABG surgery. The findings suggest that supplementation of Se before or during CABG and that of Co after CABG may become necessary for patients undergoing CABG. Further study is warranted to clarify the correlation of Se and Co and the development of postoperative AF.

ABSTRACTS

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ORAL ABSTRACTS PRESENTATION

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**Endovascular Treatment for Traumatic Aortic Transection: 13 Years Experience of a Single Center**

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**Background:** Acute traumatic aortic transection most commonly affects the proximal descending aorta and carries high risk of rupture and mortality. Open surgical repair of the ruptured segment of aorta is associated with high operative risk. Endovascular treatment arises and showed promising results as a safe alternative. Aim of this article is to review our experience with endovascular approach for the treatment of acute traumatic aortic transection.

**Methods:** Between April 2006 and November 2019, 12 patients presented to our institute with a diagnosis of traumatic aortic transection. Whole body Computed Tomography (CT) evaluation and thoracic endovascular aortic repair (TEVAR) was performed in both elective and emergency bases. Perioperative parameters were retrospectively reviewed and analysed.

**Results:** The overall 30 days survival was 100% and 1 year survival of 87.5%, there was no recorded procedural related neurological complications. All other patients had a zone III transection and at least grade 3 aortic transection. There was no stent graft failure, collapse, endoleak or distal migration were detected at follow up CT Scans.

**Conclusions:** In our experience, TEVAR performed in emergency settings for the multiple trauma cases with aortic transection brings acceptable outcome. Long term evaluation would be needed to understand effect of the stent graft and aortic remodelling with aortic traumatic injury.

## ABSTRACTS

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**Prognostic Value of Hepatorenal Function by Modified Model for End-stage Liver Disease (MELD) Score in Patients Undergoing Double Valve Replacement**

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**Background:** The Model for End-stage Liver Disease excluding international normalized ratio (MELD-XI) score and the modified MELD score with albumin replacing international normalized ratio (MELD-Albumin) score, which reflect liver and renal function, have been reported as predictors of adverse events in the liver and heart disease. Nonetheless, their prognostic value in patients undergoing double valve replacement has not been addressed.

**Methods:** A total of 210 patients who underwent double valve replacement were evaluated. Baseline clinical characteristics, dugs, laboratory, and echocardiography parameters were recorded. The adverse outcome was defined as the occurrence of heart failure requiring admission or all-cause mortality with data retrieved from the interhospital computer medical system.

**Results:** In multivariable Cox Regression Analysis, both of the MELD-XI score and MELD-Albumin score were significantly associated with long-term adverse events but not significantly associated with 1-year adverse events. MELD-XI and MELD-Albumin scores were excellent predictors of 1-year adverse outcome (area under the curve: 0.65 and 0.66, respectively) and long-term adverse outcome (area under the curve: 0.61 and 0.68, respectively). Kaplan-Meier survival curve demonstrated that a high score on MELD-XI ( $\geq 10.94$ ) and MELD-Albumin ( $\geq 9.80$ ) were significantly associated with an increased risk of 1-year adverse events. During a median follow-up of 74 months, the high score on MELD-XI ( $\geq 12.36$ ) and MELD-Albumin ( $\geq 10.84$ ) scores were significantly associated with an increased risk of long-term adverse outcome, even after adjusting for potential confounding factors. Smoking and atrial fibrillation were associated with long-term adverse events, age is always associated with postoperative adverse events.

**Conclusions:** Both the MELD-XI and MELD-Albumin score can provide useful information to predict long-term adverse outcomes in patients undergoing double valve replacement. The present study supports the monitoring of modified MELD score to improve preoperative risk stratification of these patients.

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**Role of Adipocyte Fatty Acid-Binding Protein in LV remodeling and Diastolic Function in Type 2 Diabetes: A Prospective Echocardiography Study**

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**Background:** Patients with type 2 diabetes mellitus (T2DM) are known to be associated with increased left ventricular (LV) mass and diastolic dysfunction. Nonetheless, the mechanism of this is uncertain and likely multifactorial. Adipocyte fatty acid-binding protein (AFABP) is a cytokine which is associated with adverse cardiovascular events. However, the role of AFABP in adverse LV remodeling and diastolic dysfunction is unknown. The aim of this study is to investigate the relationship between AFABP and the longitudinal cardiac structural and functional changes in patients with T2DM.

**Methods:** The study comprised of 176 asymptomatic T2DM patients without history of macrovascular disease (age,  $60 \pm 10$  years; men, 53.4%). Circulating AFABP concentration at baseline was measured. Patients were subsequently divided into 4 quartiles according to sex-specific AFABP cutoff. Detailed transthoracic echocardiography was performed to all patients at baseline and follow-up.

**Results:** The median duration between echocardiography assessment was 28 months. At baseline, AFABP was positively correlated with LV mass ( $R=0.19$ ,  $P<0.05$ ) and E/e' ratio ( $R=0.27$ ,  $P<0.01$ ) and negatively correlated with e' septal ( $R=-0.32$ ,  $P<0.01$ ) and e' lateral ( $R=-0.29$ ,  $P<0.01$ ). Nonetheless, AFABP was not associated with LV ejection fraction ( $R=0.13$ ,  $P=0.09$ ). Compared with the lowest AFABP quartile, the highest AFABP quartile had a higher LV mass at baseline and follow-up (all  $P<0.01$ ). Importantly, increase in LV mass was significantly greater in patients with the highest AFABP quartile than those with the lowest quartile ( $P<0.01$ ). Further, worsening of E/e' was significantly greater in the highest quartile than the other three quartiles ( $P<0.01$ ). Multivariable linear regression demonstrated baseline AFABP predicted increase in LV mass ( $\beta=0.23$ ,  $P<0.01$ ) and worsening of E/e' ( $\beta=0.24$ ,  $P<0.01$ ).

**Conclusion:** AFABP is independently associated with an increase in LV mass and worsening of E/e' in asymptomatic T2DM patients. The present study thus supports a contributing role of AFABP in the development of adverse LV remodeling and diastolic dysfunction.

## ABSTRACTS

## BEST ABSTRACTS PRESENTATION

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**The Prevalence and Prognosis of Tricuspid Regurgitation in Stage A to C Heart Failure with Preserved Ejection Fraction**

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**Background:** Previous studies have demonstrated that moderate/severe tricuspid regurgitation (TR) is associated with adverse outcome in patients with heart failure (HF) with reduced ejection fraction. However, little is known about the prevalence and prognostic value of TR in patients at risk of HF (stage A, B) and those with stage C heart failure with preserved ejection fraction (HFpEF).

**Methods:** A total of 2882 patients with stage A (n=904), B (n=1305) and C (n=673) HFpEF from 2013 to 2017 were enrolled. Detailed transthoracic echocardiogram was performed and the severity of TR was graded. Patients were prospectively follow-up at our heart failure clinic.

**Results:** The age of the study population was 65 and 47% were male. Hypertension was presence in 58% and diabetes in 33% and the mean left ventricular ejection fraction was 62%. The prevalence of moderate/severe TR increased from stage A to C HF (4.2%, 5.9% and 16.5%, respectively,  $P<0.01$ ). Older age, atrial fibrillation and higher HF stages were independently associated with moderate/severe TR. Kaplan-Meier curve revealed that the presence of moderate/severe degree of TR was associated with all-cause mortality and HF requiring hospitalization (Log-rank test  $P<0.01$ ). Multivariable analysis demonstrated that moderate (hazard ratio=1.6,  $P<0.01$ ) and severe TR (hazard ratio=2.4,  $P<0.01$ ) was independently associated with mortality and HF requiring hospitalization.

**Conclusions:** The presence of moderate/severe TR is not uncommon in patients with stage A, B and C HFpEF. Importantly, moderate/severe TR was independently associated with mortality and HF requiring hospitalization.

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**Inhibition of IRE1 branch of ER Stress Ameliorates Myocardial Ischemia/Reperfusion Injury via Inactivation of sEH and JNK/c-Jun pathway**HM Xue,<sup>1,2</sup> WT Sun,<sup>1</sup> HT Hou,<sup>1</sup> HX Chen,<sup>1</sup> J Wang,<sup>1</sup> GW He,<sup>1,3,4,5</sup> Q Yang<sup>1</sup>

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**Background:** Studies of ischemia/reperfusion (I/R) reported the respective role of endoplasmic reticulum (ER) stress and soluble epoxide hydrolase (sEH) in myocardial injury. Whether there exists a link between these two mechanisms remains unknown, which was investigated in the present study with further exploration of the signaling molecules involved in myocardial I/R injury.

**Methods:** Hearts isolated from male WKY rats were randomly allocated to five groups: control, I/R, and I/R pretreated with IRE1 $\alpha$  inhibitor GSK2850163, JNK inhibitor SP600125, or sEH inhibitor dicyclohexylurea (DCU). The rat hearts were mounted on a Langendorff apparatus and perfused with Krebs at a constant pressure. The I/R groups were then subjected to 30-min global ischemia followed by 60-min reperfusion. GSK2850163, SP600125, and DCU

were perfused for 15 min prior to the onset of ischemia. Left ventricular function was recorded and the left anterior descending artery was isolated after reperfusion to study endothelial dilator function in a wire myograph. The protein expression of phosphorylated IRE1 (p-IRE1), IRE1, JNK, c-Jun, and sEH was determined by western blotting.

**Results:** Left ventricular end diastolic pressure (LVEDP) was increased and the maximum velocity of contraction (+dp/dtmax) and relaxation (-dp/dtmax) of the left ventricle were decreased during I/R, which could be partially reversed by GSK2850163, SP600125, or DCU preconditioning. Pretreatment with GSK2850163, SP600125, or DCU also preserved the acetylcholine-induced coronary artery relaxation in hearts subjected to I/R. Inhibition of IRE1 phosphorylation by GSK2850163 significantly downregulated the protein expression of JNK, c-Jun, and sEH.

**Conclusion:** The IRE1 branch of ER stress mediates cardiac and coronary dysfunction in myocardial I/R through activation of sEH and JNK/c-Jun pathway.



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**Prolonged Valsartan Use and Cancer Risk**

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**Background:** Generic valsartan suspected to be contaminated by nitrosamines was recalled in Hong Kong in 2018. The study aimed to investigate whether the prolonged use of valsartan is associated with increased cancer risk.

**Methods:** Patients prescribed valsartan or amlodipine (control group) from 1st January 2003 to 30th June 2009 were identified using the Clinical Data Analysis and Reporting System of the Hong Kong Hospital Authority. Patients previously diagnosed with cancer, prescribed both medications, or taking the medication for less than a year before the cancer diagnosis were excluded from analysis. Patients were followed until a cancer outcome, loss to follow-up, or end of study period (31st June 2019), whichever occurred first. Cancer incidence was the primary outcome, and incidences of common cancer types were the secondary outcomes. Results were analysed using R version 3.6.1. The incidence rate, incidence rate ratio, and 95% confidence interval (CI) of cancers were estimated using Poisson regression.

**Results:** Among 5023 valsartan users and 3692 amlodipine users, 887 and 740 were diagnosed with cancers, respectively, with median follow-up periods of 10.97 and 12.12 years. The age and sex-adjusted incidences of cancer for valsartan and amlodipine users were 168.67 (95% CI 157.92-180.01) per 10,000 person-years and 175.83 (95% CI 163.85-188.94) per 10,000 person-year, respectively. The cancer incidence rate ratio of valsartan relative to amlodipine was 0.938 (95% CI = 0.879-1.000). Incidence rate ratios of valsartan relative to amlodipine were insignificant for breast (0.99, 95% CI 0.66-1.48), colorectal (1.00, 95% CI 0.82-1.22), lung (0.92, 95% CI 0.73-1.66) and prostate cancers (0.92, 95% CI 0.58-1.46).

**Conclusion:** Valsartan use was not associated with increased cancer incidence when compared to amlodipine during a follow-up period of more than 10 years.

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**The Impact of Metabolic Syndrome on Air Pollution (PM2.5)-related Atherogenesis in Modernizing China: A Report from CATHAY Study**

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**Background:** Air pollution (AP) and metabolic syndrome (MS) are imminent global health hazard of the 21st century, in mainland China in particular. AP has been associated with prevalence of cardiovascular diseases, stroke and respiratory disorders.

**Aim:** To evaluate the impact of metabolic syndrome on AP-related atherogenesis.

**Subjects and methods:** 1557 Han adults (mean age 47.2±11.8 years, male 47%) in Hong Kong, Macau, Pun Yu, Yu County (coal mine in Shanxi), and 3-Gorges (Yangtze River) were studied. Cardiovascular risk profiles (smoking, body mass index BMI, waist circumference, blood pressure SBP/DBP, LDL-cholesterol, triglycerides TG, and fasting glucose) and metabolic syndrome (IDF criteria) were evaluated. PM2.5 (satellite sensor modeling) and atherosclerosis surrogates brachial reactivity (FMD) and carotid intima-media thickness (IMT) were measured. Multivariate linear regression was performed.

**Results:** MS was diagnosed in 340 subject (21.8%). Their smoking status, gender and PM2.5 were similar in MS cohort versus the cohort without MS, but age, SBP, DBP, waist, LDL-C, TG, HDL-C and glucose were higher in MS

group. Brachial FMD is significantly lower (7.3±2.0% vs 8.1±2.65%) and carotid IMT significantly higher (0.70±0.13 mm vs 0.63 mm±0.14 mm) in MS cohort than MS negative cohort (P<0.0001).

	MS Cohort (N=340)	MS negative Cohort (N=1217)	P-Values (Bonferroni adjustment)
PM2.5 (µg/m <sup>3</sup> )	65.6±17.2	61.5±18.9	0.95
Age (yrs)	51.0±9.7	46.1±12.9	0.04
Male (%)	46.2	48.1	0.90
Smoking (%)	26.7	26.4	0.99
SBP (mmHg)	134.6±17.1	118.8±15.8	<0.001
DBP (mmHg)	86.1±9.7	76.4±10.0	<0.001
Waist (cm)	87.1±8.6	76.1±8.4	0.03
LDL-C (mmol/l)	2.9±1.0	2.8±1.0	0.062
TG (mmol/l)	2.1±1.6	1.1±0.8	<0.001
HDL-C (mmol/l)	1.01±0.21	1.27±0.35	<0.001
Glucose (mmol/l)	6.0±1.3	5.3±0.9	<0.001
Brachial FMD (%)	7.3±2.0	8.1±2.6	<0.0001
Carotid IMT (mm)	0.7±0.13	0.63±0.14	<0.0001

On multivariate regression, PM2.5 was significantly related to carotid IMT in both MS-negative cohort (beta=0.492, P<0.0001) and MS cohort (beta=0.285, p<0.0001), independent of age, smoking, gender, LDL-C and locations. The detrimental impact of PM2.5 was greater in subjects with no MS (R<sup>2</sup>=0.468, F-value=131.6, P<0.0001), compared with MS subjects (R<sup>2</sup>=0.223, F-value=14.8, P<0.0001).

**Conclusion:** Both AP and MS have independent impact on atherogenic process in China, with implication in atherosclerosis prevention.

## ABSTRACTS

## BEST CHALLENGING/INTERESTING CARDIAC INTERVENTION CASES PRESENTATION

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**Left Bundle Branch Pacing as a Physiological Pacing Alternative to Cardiac Resynchronization Therapy in Patients with Heart Failure and Left Bundle Branch Block**

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**Background:** Cardiac synchronization (CRT) is indicated in patients with left ventricular ejection fraction (LVEF)  $\leq 35\%$ , QRS  $\geq 150$  ms and congestive heart failure (CHF) despite optimal medical therapy. However, some patients with CRT indications could not benefit from the therapy due to implantation failure or financial constraints. Even with successful CRT implantation, the non-responder rate remains as high as 30%.

**Case:** We report a 70-year-old male patient who suffered from decompensated CHF, first-degree atrioventricular block (AVB), left bundle branch block (LBBB) and poor LVEF of 35%. He had junctional bradycardia with wide complex escape. He had indication for CRT implant but he could not afford the procedure due to financial reason.

**Decision making:** Left bundle branch pacing (LBBP) was performed as a physiological pacing alternative to CRT in this patient with CHF and cardiac conduction disease.

**Procedure description:** The procedure was performed under local anesthesia. Venous access was obtained by left subclavian puncture. The 4.1Fr Select Secure 3830 active fixation lead was delivered into the right ventricle (RV) via 7Fr C315 fixed-curve delivery catheter. The His signal was mapped and

identified using the Select Secure lead in unipolar mode. After identifying the His location, the lead was advanced 1-2 cm more apically from the His location. The optimal LBBP site was initially identified by searching for "W-shape" morphology in V1 during RV pacing. The lead was then screwed into interventricular septum (IVS). The optimal depth of lead implantation was determined by QRS width and morphology in V1 during high/low-output pacing, and serial impedance measurement. The lead was finally implanted at posterior septal region close to left posterior fascicle area. During LBBP, the V1 morphology changed from LBBB pattern to rSR pattern. The QRS was shortened from 150ms to 120ms. Echocardiogram 3 days after procedure showed improvement of LVEF from 35% to 45%. The mitral regurgitation (MR) severity was reduced and the diastolic MR was eliminated during LBBP. The patient's CHF symptoms improved after the procedure. He could tolerate beta-blocker therapy well after LBBP.

**Conclusion:** Left bundle branch pacing (LBBP) could be a viable physiological pacing alternative to CRT in patients with heart failure and CRT indications. Left bundle branch block could be eliminated by LBBP. Improvement of LVEF and MR severity could be demonstrated as short as 3 days after procedure.

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**A Case of Percutaneous Mitral Valve Repair in Acute Mitral Regurgitation Following Myocardial Infarction**

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**Background:** Acute mitral regurgitation in the setting of acute myocardial infarction was associated with increase mortality and morbidity. The mechanisms include papillary muscle rupture/dysfunction, or leaflet tethering following sudden onset of regional or global left ventricular dysfunction. This can lead to pulmonary edema or cardiogenic shock in acute or subacute phase of myocardial infarction. Large scale clinical data of MitraClip (Abbott Vascular) in this subset of patient is currently lacking. Here, we presented a case of acute ischemic MR and pulmonary edema following ST elevation MI. He was successfully managed with the MitraClip device.

**Case:** A 77-year-old gentleman with PCI to LAD done in outside hospital presented to us with chest pain and acute pulmonary edema. He developed respiratory failure requiring mechanical ventilatory support. Initial ECG revealed anterior ST elevation. Cath lab was activated and primary PCI was performed. Angiography and OCT showed acute stent thrombosis leading to LAD occlusion. He made initial recovery following successful OCT guided PCI to LAD. However, he had subsequent rapidly downhill clinical course with frank pulmonary edema and was re-intubated. TEE showed impaired ejection fraction with regional wall dysfunction, and severe acute ischemic MR due to restricted posterior leaflet

motion. Repeated cardiac catheterization showed patent coronaries, giant CV wave compatible with severe MR with significantly elevated LVEDP. He was refractory to medical therapy and failed to wean off ventilator. Percutaneous mitral valve repair was suggested after HEART team review. It was successfully performed with the MitraClip device under TEE guidance. There was mild residual MR post procedure with satisfactory hemodynamic improvements. There was no serious complication. He was weaned off ventilator post procedure. Clinically, he was out of heart failure with good functional recovery. He was discharged with medical therapy. During his clinic visit at 1 month, he was ambulatory NYHF class I.

**Discussion:** Percutaneous repair of acute MR in AMI is an emerging alternative to surgery. It offered potential advantage of rapid decrease of left atrial/pulmonary pressures and increase in cardiac output while avoiding major operation in AMI setting. Good early outcome was achieved in this particular patient with acute ischemic MR refractory to medical therapy and favorable anatomic characteristics. Improvements in echographic, hemodynamic and clinical parameters were demonstrated.

**Conclusion:** In this case report of acute mitral regurgitation following myocardial infarction, edge-to-edge mitral valve repair with the MitraClip was successful with good early outcome. Further investigation in this setting may be warranted.

ABSTRACTS

BEST CHALLENGING/INTERESTING CARDIAC INTERVENTION CASES PRESENTATION

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**Reperfusion Injury Prevention, A Volume-Controlled Reperfusion Method in Acute Coronary Artery Occlusion**

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**Background:** Ischemic reperfusion injury (IRI) prevention is a challenging task during primary percutaneous catheterization intervention. We report a case with modified ischemia preconditioning (IPost) in an acute proximal occlusion of right coronary artery (RCA). **Case:** A 54-year-old man diagnosed with acute inferior ST elevation myocardial infarction for 6 hours, with prourokinase thrombolysis failure, was ready for rescue percutaneous intervention. Angiography demonstrated proximal total occlusion of RCA. Radial route 6F JR guide catheter engaged. Heart rate drop to 40-50 bpm and blood pressure drop to 70/50 mmHg seconds during wire1 manipulation. The 3.0x15 mm balloon was delivered to occlusion site and inflated to 8atm immediately. Intravenous injection of Atropine 1mg, Dopamine 3 mg. Heart rate was back to over 80 bpm, blood pressure is 110/70 mmHg. While keeping NC balloon inflation, another 6F guide catheter engaged to RCA via right femoral route, wire2 across the balloon to distal RCA, aspiration catheter was positioned 10-15 mm advanced of NC balloon via wire2; angiography via aspiration catheter to confirm distal part patency; intra- aspiration catheter infusion of mixture solution (artery blood 10 ml+

heparin NS 10 ml), 20 ml/min for 5 mins, adjust volume and speed according to blood pressure and heart rate variation. Then, balloon deflated, perform angiography when hemodynamic status was stable. Two overlapping drug-eluting stents were deployed from mid to proximal RCA. TIMI III blood flow was documented after post dilation with 3.5x12 mm balloon at 12-16 atm. Patient was safe transferred to ICU with stable condition. Elevated ST-segment resolute to base level. No lethal arrhythmia or severe discomfort was documented.

**Decision making:** IPost proved to be effective in many early studies and some small group studies, while neutral results in large randomized controlled trial(RCT). IPost procedures mainly copied from ischemia preconditioning procedures, there are several inherent defects of current IPost procedure in attenuating IRI. based on our understanding of IPost and "Gradual Reperfusion", we introduced "Volume-Controlled Revascularization, VCR". Contemporaneous forward blood flow balloon inflation blocking at the occlusion site and distal reperfusion via aspiration catheter. RCT is carried out to prove effect on IRI.

**Conclusion:** Volume Controlled Revascularization method is feasible and safe in this case, could be served as an effective method to attenuate IRI. Medicine can be delivered to distal part of artery before IRI happened in pharmacological preconditioning with this method.

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**Strange Bedfellows**

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**Background:** ST-elevation myocardial infarction (STEMI) with large thrombus load is a big challenge to interventional cardiologists. This case presents an unconventional method of tackling the problem.

**Case:** 58 years old female, with history of old stroke, hypertension, aortic valve bioprosthesis for aortic valve stenosis, was admitted for anterior STEMI with cardiogenic shock. Per protocol, she was sent to the cath lab for emergency primary percutaneous coronary intervention. Coronary angiogram of the right was unremarkable but damping of pressure was noted upon engagement of the left coronary artery. However, initial coronary angiogram only showed haziness of the left main ostium with Thrombolysis In Myocardial Infarction (TIMI) flow score of 3 in both arteries. The left anterior descending artery was then wired with a sion wire and a non-selective angiogram was performed which showed a large left main coronary artery (LMCA) ostium with a huge thrombus. Intravascular ultrasound confirmed the presence of a large thrombus causing 90% obstruction to the LMCA.

**Decision making:** As the patient was in cardiogenic shock, immediate treatment of the LMCA thrombus was necessary. However, in the presence of a huge thrombus, distal embolisation causing no reflow was a common and potentially lethal complication. The large size of the LMCA was also a concern. A decision was made to utilise a peripheral cover stent which would be big

enough and can potentially trap the thrombus, preventing distal embolisation. The LAD wire was exchanged to a V18 (0.018") guidewire and a Begraft peripheral stent 5x18 mm was successfully implanted at the ostium of the LMCA. There was immediate resolution of the ST segment elevation and improvement in the patient's hemodynamic state. The post-PCI angiogram showed a patent LMCA with no distal embolisation and TIMI 3 flow in both the LAD and LCx.

Patient was subsequently discharged from the hospital symptoms free. She had a 6 months follow up angiogram which showed patent coronary arteries with mild restenosis at the distal stent.

**Conclusions:** Acute STEMI with large thrombus burden is a challenging problem to manage. IVUS is a quick and effective to help in assessing and characterising the lesions when performing PCI. It is important to know the various tools available to you and think outside of the box. Peripheral cover stents is a viable treatment option when treating ostial left main lesions.

## ABSTRACTS

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**Double Patch Post-infarction Ventricular Septal Rupture Repair with Infarct Exclusion for Inferoposterior Myocardial Infarction**JWY Chan, SCY Chow, WT Kwok, RHL Wong  
Prince of Wales Hospital, Hong Kong

**Background:** Surgical repair of post-infarction ventricular septal rupture (VSR) carries a high operative mortality up to 42.9% historically. We present our technique of concomitant double patch septal repair and ventricular restoration with infarct exclusion.

**Case:** A 73-year-old man had delayed presentation of posteroinferior STEMI 10 days after onset. IABP was inserted for APO and cardiogenic shock. Coronary angiogram showed triple vessels disease. Echocardiogram confirmed a 2 cm inferoposterior VSR with significant left to right shunt, a mid-inferior left ventricular wall pseudoaneurysm, and LVEF of 40%. After initial stabilization, emergency repair was performed.

Following cardiopulmonary bypass and cardioplegic arrest, CABG was done to mLAD and D1. The heart was lifted cranially, exposing inferoposterior wall LV pseudoaneurysm with in-sucking and thinning. Infarctectomy was performed, and the 2x2 cm posterior VSR was trimmed till areas of healthy myocardium, resulting in a 6x2 cm septal defect. Septal double pericardial patch repair was performed by parachuting the first 8x4 cm oval patch to the RV side with interrupted 3/0 prolene, followed by a second patch on the LV side which was left long and redundant for infarct exclusion. Ventriculotomy was closed with infarct

exclusion technique with double folding of the second patch, reinforced with two felt strips and additional 3-0 sutures.

IABP was weaned on day 3. Echocardiogram on day 6 showed no residual VSR or pseudoaneurysm, and improved LVEF of 61%.

**Decision making:** We describe a novel technique of double patch repair of VSR with the LV side of patch extending to exclude both the septal defect and ventriculotomy zone from high LV pressures. The septal patch is applied with interrupted sutures instead of continuous so that in case of suture cut-through of unhealthy septal tissue, the overall integrity of the patch will still be maintained. Aggressive trimming of friable infarcted septal tissue is preferred, so as provide a reliable repair. Double patch sandwich repair provides a more competent repair than single patch as it better sustains pressure from both right and left ventricles, and provides structural support to the septal wall itself. By extending the LV patch to cover the ventriculotomy/infarctectomy area as opposed a separate patch for infarct exclusion, we reduce suture placement and shortens operative time.

**Conclusion:** Double patch VSR repair with infarct exclusion technique provides a robust repair that is promising in the treatment of post-infarction VSR.

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**The First Case of Impella RP use in Acute Right Ventricular Failure from Air Embolism**Y Khalid,<sup>1</sup> N Dasu,<sup>1</sup> K Dasu<sup>2</sup><sup>1</sup>Rowan University; <sup>2</sup>Syracuse University, USA

**Background:** Currently there is a paucity of data on Impella RP use in rare causes of acute right ventricle (RV) failure. Current indications for Impella RP are limited and further research, such as additional cases and trials, is needed to expand the indications for Impella RP to generalized isolated right ventricular failure. To our knowledge, there have been no reports in the literature of RP impella use for RV failure due to air embolism.

**Case report:** We report a case of a patient with acute RV failure due to air embolism who recovered from the temporary use of Impella RP. The patient underwent a minimally invasive mitral valve repair with a 32 mm Edwards annuloplasty ring and left atrial appendage ligation. Shortly after the patient became hypotensive and went into cardiac arrest secondary to ventricular fibrillation. Appropriate ACLS protocol was initiated. A bedside transthoracic echocardiogram revealed a significant amount of air within the right ventricle consistent with air embolism. Due to hemodynamic instability from the air embolism, air was aspirated from the right central internal jugular vein catheter. A bedside transesophageal echocardiogram revealed significant dilation of the right atrium and ventricle along with ejection fraction (EF) of 20-25%. The

patient then required vasopressors for hemodynamic support. Subsequently, the decision was made, due to worsening hypotension despite vasopressor support, to take the patient to the cardiac catheterization laboratory for placement of an Impella RP. During the placement of the Impella RP, the patient had refractory ventricular fibrillation and an electrical storm despite twenty electrical cardioversions. The patient had pulse oximetry readings of 100% but had right-sided jugular venous distention along with a cyanotic face and upper extremities. Immediately after placement of the Impella RP, the patient's ventricular fibrillation ended.

**Decision making:** We elected to proceed with Impella RP implantation because the patient received all guideline-based treatment with volume expansion, vasopressors, electrical cardioversions, and inotropic support, but remained in refractory cardiogenic shock for RV failure secondary to air embolism.

**Conclusion:** Our case outlines both an extremely rare complication of air embolism after minimally invasive mitral valve repair with hemodynamic collapse, cardiac arrest due to ventricular fibrillation, and a novel use of the Impella RP as salvage therapy. Further studies will be required to expand the indications of the Impella RP. This case also illustrates that it is imperative for clinicians to keep in mind rare causes of acute RV failure.

## ABSTRACTS

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**Massive Pulmonary Embolism Successfully Resuscitated by E-CPR and Percutaneous Thrombectomy**SY Au,<sup>1</sup> SF Chui,<sup>2</sup> KM Fong,<sup>1</sup> KT Chan,<sup>2</sup> MKY Lee<sup>2</sup><sup>1</sup>Intensive Care Unit, Queen Elizabeth Hospital; <sup>2</sup>Cardiology, Queen Elizabeth Hospital, Hong Kong

**Background:** A patient with out-of-hospital cardiac arrest due to massive pulmonary embolism was successfully managed by the cocktail of extracorporeal resuscitation, percutaneous thrombectomy and systemic heparin, in contrast to current guidelines' recommendations of prolonged chest compression and thrombolytic.

**Case:** A 55-year-old obese man admitted for chest infection developed central line associated left lower limb proximal deep vein thrombosis. Despite full anticoagulation, he developed sudden cardiac arrest with pulseless electrical activities. Echocardiography showed dilated and pressure-overloaded right ventricle. The cardiopulmonary resuscitation was refractory in 15 minutes' time and extracorporeal cardiopulmonary resuscitation was started with total down time of 28 minutes. Percutaneous pulmonary angiography was performed in the Cardiac Catheterization laboratory as it provided better contrast enhancement as compared with conventional computer tomography because the contrast was less drawn by the ECMO circuit. Furthermore, ad-hoc percutaneous intervention could be performed when the diagnosis of pulmonary embolism was confirmed. The angiography confirmed bilateral massive main trunk pulmonary embolism with no distal flow. Ad hoc thrombectomy was

performed and yielded large red clots. Despite residual clots, distal blood flow was much improved after thrombectomy and further thrombus propagation was prevented by systemic anticoagulation and auto-fibrinolysis. The ECMO was decannulated in 3 days and the patient was extubated in 8 days. He required life-long anticoagulation.

**Decision making:** The cocktail of veno-arterial ECMO (VA-ECMO), percutaneous thrombectomy and systemic anticoagulation is beneficial for patients who developed cardiac arrest after massive pulmonary embolism. According to the European Society of Cardiology, the recommended management includes prolonged chest compression of 60-90 minutes and for systemic thrombolytic during resuscitation. However, thrombolytic is relatively contra-indicated after prolonged resuscitation. The risk of surgical thrombectomy is again very high especially with his deranged physiology and clotting profile immediately post resuscitation. Meanwhile, massive pulmonary embolism is lethal due to pulmonary shunting of blood, acute right heart failure and obstructive shock, and such pathophysiology perfectly matches the working mechanisms of VA-ECMO. With systemic anticoagulation and auto-fibrinolysis facilitated by percutaneous thrombectomy to improve distal pulmonary flow, the pulmonary emboli should resolve with time.

**Conclusion:** The cocktail treatment of extracorporeal resuscitation, percutaneous thrombectomy and systemic heparin tackles well the lethal mechanisms of massive pulmonary embolism while avoiding the potential complications of thrombolytic in a patient with prolonged chest compression.

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**Polymorphic Ventricular Tachycardia in a Patient with High Dose Methadone Use**

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**Background:** Methadone is usually used for the treatment of pain and opioid addiction. This medication may be associated with acquired QT prolongation and torsade de pointes (TdP).

**Case:** A 44-year-old female patient who presented herself with sudden onset of impaired consciousness at emergency room. She was also a methadone user for opioid addiction, receiving 130 mg/day. First 12 lead Electrocardiography revealed sinus rhythm with frequent PVCs. Echocardiography revealed preserved left ventricle systolic function with mild tricuspid regurgitation. The electrolytes level was within normal limit. However, recurrent conscious disturbance was found about several minutes after first episode. ECG monitor showed polymorphic PVCs, R on T, varying and twisting QRS complexes around the baseline, suggestive of TdP with unstable hemodynamic status. The ECG rhythm was converted to sinus rhythm by herself after three times of 200J defibrillation. Repeated ECG showed sinus rhythm with obvious QT prolongation (QT interval >600 milliseconds).

**Decision making:** We gave her lidocaine and magnesium sulfate to treat the potentially fatal ventricular arrhythmia. After reviewing her medical history, she denied any history of syncope or premature family history of sudden death. Moreover, the previous ECG was documented 2 years ago which showed sinus rhythm with normal QT interval. According to the prolonged QT interval

and medical background of high dose methadone use, acquired Long QT syndrome was suspected. Eventually, we discontinued methadone and replaced it with benzodiazepine. Acute coronary syndrome was excluded because coronary computed tomography showed insignificant coronary artery disease with eccentric plaque over left anterior descending artery. No recurrence of ventricular arrhythmia was noted after discontinuation of methadone use. QT interval was shortened to near 460 milliseconds before discharge.

Methadone may be associated with polymorphic ventricular tachycardia and QT prolongation induced TdP. Methadone inhibits the Human Ether-a-go-go related gene encoding for a potassium channel protein that regulates I<sub>Kr</sub>. This I<sub>Kr</sub> blockage may cause prolonged duration of the phase III of the ventricular action potential. Moreover, hypokalemia, hypomagnesemia, hypocalcemia, concomitant use of psychiatric medication or anti-Human Immunodeficiency Virus medication can also predispose the effect of QT prolongation from methadone.

**Conclusion:** Methadone induced QT prolongation and TdP are rare but serious events. Physicians should monitor the QT interval before and during the methadone use, especially when high doses of methadone are prescribed.

## ABSTRACTS

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**Case Report of Successful Peripheral VA ECMO in a Patient with Chronic Type B Aortic Dissection**

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**Background:** Aortic dissection is in general considered a contraindication for peripheral VA-ECMO. This is a case report of successful use of peripheral VA-ECMO in a patient with aortic dissection bridging to recovery, challenging the orthodox.

**Case:** A 53-year-old man with history of thoracic aortic arch aneurysm and chronic type B aortic dissection from just distal to the left subclavian artery to bilateral common iliac arteries, underwent an elective Bentall operation. He developed low cardiac output state but the bypass could be weaned off and the sternum was closed.

In 8 hours' time, he required escalating inotropes. Different mechanical circulatory supports were contemplated: Intra-aortic balloon pump (IABP) was contra-indicated in aortic dissection. Retrograde insertion of Impella would be technically difficult and could traumatize the newly implanted aortic graft and aortic valve. The patient was too ill to be transferred for re-sternectomy to establish central VA-ECMO. Percutaneous cannulation of the subclavian artery was technically difficult especially in that emergency setting. We finally resorted to peripheral VA-ECMO as a bail-out support.

**Decision making:** Firstly, the pre-operative computer tomography scan was reviewed to ensure that the major organs were all supplied by the true lumen, as the fast retrograde blood flow will distend the true lumen while compressing the false lumen. Secondly, real-time transesophageal echocardiography was performed to guide the arterial cannulation. The true and the false lumen of the dissection at the descending aorta were identified and the guidewire was visualized when it was advanced retrogradely from the femoral artery. The guidewire did accidentally go to the false lumen in the first 2 attempts and it was redirected to the true lumen. The artery catheter was inserted by direct visualization by re-opening the cut down femoral wound created during bypass. Thirdly, in view of poor left ventricular function, preemptive left ventricular venting was considered. As both IABP and Impella were contraindicated, a catheter was inserted from right pulmonary vein to reach the left ventricle through the left atrium for left ventricular venting.

He was given 12.5 mg of levosimendan infusion. In 5 days' time, the left ventricular function improved and the patient could have his VA-ECMO support terminated and subsequently discharged home.

**Conclusion:** With real time echocardiography guided cannulation, careful review of the supply to the major organs and early planning of left ventricular venting technique, peripheral VA-ECMO can still be beneficial in aortic dissection.

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**First Marginal Heart Transplantation Utilizing Organ Care System in Asia**KL Wong,<sup>1</sup> OJ Lee,<sup>2</sup> C Ho,<sup>2</sup> K Fan,<sup>1</sup> T Au<sup>2</sup><sup>1</sup>Grantham Hospital; <sup>2</sup>Queen Mary Hospital, Hong Kong

**Background:** Shortage of donor availability remained the Achilles heel for heart transplantation. Significant proportion of donor hearts were being declined due to single or more commonly multiple marginal features. The organ care system (OCS) has been previously reported to be safe and effective in accessing acceptability of marginal donor heart without compromising post heart transplantation outcomes. In this report, we described the first marginal heart transplantation utilizing OCS in Asia.

**Case:** The recipient is a female 54 years old who has dilated cardiomyopathy with biventricular failure and decompensation with ventricular tachycardia. Echocardiogram revealed left ventricular ejection fraction about 15% with severe clinical low cardiac output state with poor appetite, nausea, vomiting, cold periphery and lactic acidosis required double inotropic support for stabilization. Cardiac catheterization revealed normal coronary arteries with elevated mean right atrial pressure 17 mmHg, elevated pulmonary capillary wedge pressure 21 mmHg, systemic pressure 95/57 mmHg, mean systemic pressure 70 mmHg, pulmonary arterial pressure 33/19 mmHg, mean pulmonary arterial pressure 25 mmHg, significant low cardiac output and cardiac index of 1.43 L/min and 1.03 L/min/m<sup>2</sup> despite inotropic support. Given her critical state with

biventricular failure, she has priority listing for heart transplant waiting list. A heart transplant donor aged more than 55 with prior history of smoking was available and coronary angiogram revealed large dominant right coronary artery with 70% stenosis over distal right coronary artery before bifurcation to large posterior descending artery and large posterolateral branches.

**Decision making:** Given advance donor age with significant coronary artery lesion, the graft would have been declined in the past. However, given urgency of recipient, transplant team decided to proceed to use OCS for donor management and assessment. The donor heart was successfully connected to the OCS and cardiac contractility by direct visual assessment was good. Serial lactic acid assessment of the graft showed good down trend and extraction of lactic acid from the donor heart and thus the team decided to accept the graft. Subsequent heart transplantation with coronary artery bypass grafting was performed smoothly and the post-op recovery of the recipient was satisfactory.

**Conclusion:** This is the first successful marginal heart transplantation utilizing organ care system in Asia. With the use of OCS, we aim to expand the availability of suitable heart organs for transplantation.

ABSTRACTS

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**Another Simple Pericarditis?**

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Princess Margaret Hospital, Hong Kong

**Background:** A 19-year-old gentleman, with past history of sinusitis, aseptic meningitis upon birth & subsequent epilepsy, came back from the UK presenting with fever, sore throat, chills with myalgia, as well as pleuritic chest pain.

**Case:** COVID-19 was ruled out. Despite appropriate medications, his chest pain worsened together with epigastric pain. Fever persisted. Urgent CT was arranged for him showing findings suspicious of pericarditis. Serial ECG after admission revealed the classical findings compatible with pericarditis. He was taken over to CCU with treatment for pericarditis started.

Unfortunately, despite empirical broad spectrum antibiotics & anti-inflammatories, his symptoms worsened with borderline blood pressure, increasing tachypnoea & persistent fever. Blood tests showed sky high white cell count up to 50 with neutrophil predominance.

Serial echocardiograms showed a gradual increase in posteriorly-located pericardial effusion with fibrin, with striking findings of constriction physiology. Significant respirophasic changes in mitral & tricuspid inflow were demonstrated. Right-sided cardiac chambers were not collapsed, rather, the RA & the IVC were dilated.

CT was repeated for deteriorating hemodynamics showing a rim-enhancing pericardial effusion.

**Decision making:** In view of the constrictive physiology demonstrated in echocardiograms, surgical intervention was deemed necessary for the patient & he was sent immediately to Queen Elizabeth Hospital Cardiothoracic Surgery team for emergency surgery.

**Conclusion:** The classical teaching of constrictive pericarditis describes patients with prior insult to the pericardium such as surgery, previous tuberculosis infection, prior radiotherapy exposure, etc, such that the pericardium is calcified as a cage hindering the expansion of the heart. However, with the presence of purulent and fibrin-rich effusion, constrictive physiology can become evident and life-threatening (Effusive-constrictive pericarditis) as well.

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**A Case of the Novel Coronavirus (COVID-19)-induced Myocarditis and Takotsubo Cardiomyopathy**

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<sup>1</sup>Rowan University; <sup>2</sup>Syracuse University, USA

**Background:** There is minimal data on the cardiac manifestations of SARS-COV-2.

**Case report:** We present a patient with COVID-19 pneumonia complicated by hypotension and cytokine storm, followed by viral myocarditis and takotsubo cardiomyopathy.

**Discussion:** Rapid improvement of cardiac function after treatment highlights the importance of obtaining early cardiac biomarkers and non-invasive imaging in this population.

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**Clinical Application of Fetal Pulmonary Valvuloplasty for Fulmonary Atresia with Intact Ventricular Septum with Worsening Right Ventricular Hypoplasia: Combined with Postnatal Outcomes**

S Pan

Qingdao Women and Children's Hospital, Qingdao, China

**Background:** Fetal pulmonary valvuloplasty (FPV) may inhibit progression of pulmonary atresia (PA) or critical pulmonary stenosis (CPS) in early and middle phases of pregnancy to hypoplastic right heart syndrome (HRHS).

**Methods:** FPV was operated using a prediction score for a non-biventricular outcome and a series of characteristics of fetal echocardiography (Echo). We evaluate postnatal outcomes in 13 fetuses with PA with intact ventricular septum (IVS) (n=10) or critical pulmonary stenosis (CPS) (n=3) between July 2018 and June 2019. Live born infants after FPV were followed up for at least 6 months to summarize the indications of FPV.

**Results:** Median single ventricular outcome prediction score was two scores (1 score to 4 scores) with an obvious reduction of the right ventricle. All fetal Echo showed complete reverse flow of ductus arteriosus and massive tricuspid regurgitation (3.50 to 4.22 m/s). All fetuses were observed for at least 2 weeks before FPV to determine RV development stagnation. 3/13 fetuses were selected to termination of pregnancy due to heart failure or RV dependent coronary artery circulation (RVDCC) after FPV. 10/13 live births after birth. The median

follow-up was 11.5 months (6 months to 17 months). 6/10 cases received percutaneous pulmonary valvuloplasty (PBPV) and PDA stenting at the same period. Four of them have achieved biventricular circulation, two still have an undetermined circulation. 3/10 patients were treated with PBPV alone and one case without any intervention. Of 10 live births of FPV fetuses, the currently confirmed proportion of biventricular circulation is 70%.

**Conclusions:** Presently, we use a prediction score for a non-biventricular outcome and Echo indications to screen right fetuses receiving FPV preliminarily. In selected fetuses with PA/IVS or CPS in-utero, FPV helps to promote the true development of the RV by reduced afterload and increased filling. Thus improving the chances for a biventricular outcome.

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**Thrombocytopenia Associated with Transcatheter Closure of Giant Patent Ductus Arteriosus**

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**Introduction:** Thrombocytopenia occasionally occurred following closure of some giant patent ductus arteriosus cases. Unfortunately, there is no associated research describing the associated risk factors of thrombocytopenia post-procedure.

**Methods:** We reviewed all patients received occluder with size  $\geq 10/12$  mm between January 2013 and June 2019. All the data and information on characteristics of patients and their follow-up has been recorded. Univariate analysis, receiver operating characteristic curves and linear regression have been used to analysis the risk factor of thrombocytopenia and predictors for hospitalization stay.

**Results:** Finally, 32 patients (17.5%) suffered thrombocytopenia. Univariate analysis revealed the ration between occluder disc size (mm) and body weight (Kg) ( $1.71 \pm 0.51$  Vs.  $1.35 \pm 0.53$ ) as an independent predictive factor for thrombocytopenia, and the area under the curve of the ratio of occluder size and body weight for predicting thrombocytopenia post-closure was 0.691 (95% confidence interval: 0.589-0.792,  $P=0.001$ ). The best cut-off value for the ratio of occluder size and weight as 1.5895 with sensitivity and specificity as 68.8% and 66.9%, respectively. The each unit of the ratio of occluder size and body weight predicted an average hospitalization stay as 2.856 days (95% confidence interval: 1.380-4.332). Medication treatment would not reduce the hospitalization stay and benefit the restore of platelet.

**Conclusion:** Once the the ratio of occluder size and body weight is greater than 1.6, thrombocytopenia would always existed. While every unit of the ratio of occluder size and body weight represents almost extra 3 days hospitalization. Treatment would not reduce the hospitalization duration.



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**Attenuation of Cardiomyocyte Hypertrophy via Depletion Myh7 using CASAAV**

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**Introduction:** Myh7 is a potential target to attenuate cardiomyocyte (CM) hypertrophy. Herein, we conducted this study to answer whether the removal of Myh7 after birth would affect the CM maturation and contribute to reverse pathological hypertrophy phenotypes.

**Methods:** CASAAV technique has been used in this research to deplete the Myh6 and Myh7. While an AAV dosage of 5x10<sup>9</sup> vg/g was used to generate a mosaic CM depletion model to explore the function of Myh7 in adulthood. CM hypertrophy model was induced by transverse aortic constriction (TAC) at P28 of Rosa26Cas9-P2A-GFP mice. The heart function was measured by echocardiography. Isolated CMs and in situ imaging were used to analyses the structure and morphology of CM.

**Results:** CASAAV successfully silenced Myh6 and Myh7 in CMs. The early depletion of Myh7 lead to an adulthood lethality. However, the Myh7 P28-KO mice revealed a normal heart phenotype and function and demonstrating a normal cellular size and the organization of sarcomeres and T-Tubule. TAC mice also received AAV-Myh7-Cre to produce Myh7 KO CMs which revealed a comparable normal CMs size, while the echocardiography demonstrated a reverse of cardiac hypertrophy.

**Conclusion:** Myh7 still have a role both in maturation period, but observed a rarely function in adulthood phases, which identified the therapeutic time which should exceeded the period of maturation. Myh7 has been confirmed as a potential therapeutic target, and the inhibition of Myh7 could help to reverse CM hypertrophy.

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**AAV Gene Therapy Prevents and Reverses Heart Failure in a Murine Knockout Model of Barth Syndrome**

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Barth syndrome (BTHS) is a rare X-linked cardiac and skeletal myopathy caused by mutation of the gene Tafazzin (TAZ). Currently there is no targeted treatment for BTHS and the understanding of disease pathology and underlying mechanism has been hindered by lack of a proper genetic animal model that recapitulates the features of BTHS. Here we characterized murine germline (TAZ-KO) and cardiac specific (TAZ-CKO) Taz knockout models. TAZ-KO caused embryonic and neonatal lethality, impaired growth, dilated cardiomyopathy, and skeletal myopathy. TAZ-KO mice that survived the neonatal period developed progressive, severe cardiac dysfunction and fibrosis. Cardiomyocyte specific inactivation of floxed Taz in CMs using Myh6-Cre did not cause fetal or perinatal loss, but caused progressive dilated cardiomyopathy. Using both constitutive and conditional knockout models, we tested the efficacy and durability of Taz replacement by AAV gene therapy. Neonatal AAV-hTAZ, in which the CAG promoter drives full length human TAZ, rescued neonatal death, cardiac dysfunction, and fibrosis in TAZ-KO mice, and both prevented and reversed established cardiac dysfunction in TAZ-KO and TAZ-CKO models. However, both neonatal and adult therapies required high CM

transduction (~70%) to be durable and effective. Altogether, we characterized mammalian BTHS models that recapitulate many of the disease's clinical features, and we used the models to demonstrate that AAV-mediated gene replacement is efficacious when a sufficient fraction of CMs are transduced.

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**Paediatric Myopericarditis - A Single Regional Hospital Experience**

KS Chung, AWM Choi, WY Mak, NC Fong

Princess of Margaret Hospital, Hong Kong

**Background:** To study the clinical course, etiology and prognosis of acute myopericarditis of children in a regional hospital over a period of 20 years.

**Methods:** Acute myopericarditis is defined as patients with chest pain, diffuse electrocardiographic ST and T wave changes, elevated cardiac markers such as troponin & CK-MB, and normal left ventricular systolic function. A retrospective study of patients with diagnosis of acute pericarditis/myopericarditis admitted during the period of 2000-2019 was done through Clinical Management System (CMS) of Hospital Authority. Demographic data, symptoms, physical findings, investigations, treatment, length of stay and outcome were reviewed.

**Results:** 29 patients were identified with male to female of 28:1. The mean age was 14.4 yr (6.1-17.2). All of them presented with acute onset of non-exertional retrosternal/left side chest pain, 2 of them also had back pain. 9 and 5 of them had concomitant upper respiratory tract symptoms and gastroenteritis respectively. However all viral study was negative except 2 patients had their nasopharyngeal aspirate yielded rhinovirus/enterovirus and influenza A. Autoimmune and toxicological screening were unremarkable. Hemodynamics was stable with no pericardial rub detected. Concave upward ST elevation was commonly found over inferior leads and

V4-V6. There was no arrhythmia or deep Q wave found. The mean peak CK-MB and hs-troponin I were 794 U/L (97-3012 U/L) and 7605 ng/L (3.18-39600 ng/L) respectively. Echocardiographic study showed normal cardiac contractility in all patients. 8 patients had echogenic pericardium, 3 patients had a thin rim of pericardial effusion and 1 with mild mitral regurgitation. Twenty-three patients were treated with NSAID for chest pain; 25 out of 29 patients had improvement of chest pain within 1 day. The mean length of stay was 4.3 days (2-9 days). Two patients had CT coronary angiogram done for slow decline of troponin and persistent mild chest discomfort, and both was normal. There was no correlation of peak troponin I level and duration of chest pain and outcome. The mean follow up time was 370 days. All patients had a benign course with uneventful recovery.

**Conclusions:** Paediatric myopericarditis is mostly a benign clinical entity with good prognosis. Troponin level is not related to outcome as long as there is no cardiac dysfunction and arrhythmia.

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**Pacing Therapy in Infants with Congenital Complete Heart Block in Hong Kong**

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**Background:** Data in pacing therapy in infants with congenital complete heart block are limited. We report our experience in the single tertiary centre in Hong Kong.

**Methods:** All infants diagnosed with congenital complete heart block and aged < 1 year at pacemaker implantation from 2006 to 2018 were included. The clinical course was reviewed and changes in left ventricular dimension were analysed. Device complication was recorded.

**Results:** Eight infants were recruited, with a median FU duration of 77.3 months (IQR 35.8-136.2). Two infants (25%) had evidence of low cardiac output, while the rest of them were indicated for pacing therapy either because of asymptomatic extreme bradycardia or wide escape rhythm. The mean age of first pacemaker implantation was 9.9 days (range 1-38), with a mean escape ventricular rate of 53.8 +/- 6.2 bpm and QRS duration of 76.3 +/- 27.8 milliseconds (ms). Epicardial dual-chamber pacing system was implanted for all our infants. Two out of three infants with RV pacing developed RV pacing induced LV dyssynchrony with ventricular failure at 3 and 6 months, and ventricular function improved after the upgrade to biventricular pacing. All patients with LV basal pacing (2/2) developed ventricular dysfunction at 8 and 9 month, with improvement after reducing pacing rate. In contrast, all

patients with LV apical pacing (2/2) did not develop heart failure. Three patients had complication of epicardial lead fracture, at a median age of 108 months (range 45-129). The z-scores of left ventricular end-diastolic diameter over time were shown in graph. It demonstrated a trend of normalization of left ventricular dimension over time.

**Conclusion:** Five out of eight infants (62.5%) with congenital heart block developed subsequent ventricular dysfunction. LV apex appeared to be the most favourable pacing site.

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**Genetic Spectrum of Paediatric Cardiomyopathy in Hong Kong**  
ZJ Shi,<sup>1</sup> JFT Chau,<sup>2</sup> SY Kwok,<sup>1</sup> KS Yeung,<sup>2</sup> JLF Fung,<sup>2</sup> TC Yung,<sup>1</sup> BHY Chung,<sup>2</sup> KS Lun<sup>1</sup>

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**Background:** Primary cardiomyopathies are rare conditions among the paediatric age group with the incidence rate of 1 in 100,000 children. Albeit being widely known as genetically-determined diseases, limited studies have reported the prevalence and distribution of disease-causing mutations in children, especially in Asian. In this study, we evaluated the genetic spectrum of paediatric cardiomyopathy in a cohort of 50 patients, who were followed in our paediatric cardiology clinic in the past 15 years.

**Methods:** Paediatric patients with cardiomyopathy were assessed by cardiologists and clinical geneticist. Gene panel, exome sequencing and chromosomal microarray were offered to patients based on their clinical features. Variants were classified according to the American College of Medical Genetics and Genomics (ACMG) guidelines.

**Results:** In this study, 40% patients (20/50) were diagnosed genetically. Among these patients, eight (40%) were diagnosed with Noonan syndrome (BRAF, PTPN11 and RAF1), seven (35%) were diagnosed with syndromic conditions other than Noonan syndrome (DMPK, GAA, LAMP2, NONO, TAZ and 7q11.23 deletion), and five (25%) harbored mutations in known genes associated with primary cardiomyopathy (BAG3, MYBPC3, MYH7, MYL2 and TNNT2). In addition, 18% (9/50) carried a variant of uncertain significance.

**Conclusion:** Our study highlights the substantial diagnostic yield of genetic evaluation in paediatric patients with cardiomyopathy. Since the genetic cause of paediatric cardiomyopathy is heterogeneous, we believe exome sequencing offers better coverage for pathogenic variants in this group of patients. The genetic diagnosis is useful in clinical management and family counselling.

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**Double Balloon Dilation of Pulmonary Arterial Bifurcation Stenosis after Previous Surgical Palliations: A Case Report**

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Heart Center, Guangzhou Women and Children's Medical Center, Guangzhou, China

**Background:** A five-year-old boy was presented to our center as postoperative main pulmonary arterial bifurcation stenosis whose primary diagnosis was pulmonary atresia/ventricular septal defect/major aorto-pulmonary collateral arteries. First-stage palliation of modified Blalock-Taussig shunting was performed on September 18, 2014. Second-stage RVOT reconstruction (with valved conduit from bovine jugular vein)/ pulmonary arterial unifocalization/partial repair of ventricular septal defect was performed in our center on July 27, 2017.

**Case:** Serial follow-up echocardiographies after operations demonstrated stenosis at the anastomosis of the conduit and the bifurcation of main pulmonary artery (PA). Cardiac catheterization on September 4, 2019 shows the internal diameter of stenotic site was 7.6 mm, the diameter of proximal PA (conduit) was 14.8 mm, the proximal diameter of left PA and right PA was 8.2 mm, 9.7 mm, respectively. The main-to-left PA pressure gradient was 40 mmHg, and the main-to-right PA pressure gradient was 41 mmHg. After cardiac catheterization, the bilateral femoral veins were accessed. Two 10 mm x 20 mm BALT balloon catheters were sent to cross the stenosis with distal part in the LPA and RPA, respectively. Then simultaneous dilation of two balloons with maximum pressure of 12 atm was performed for 3 times. After dilatation, the stenosis

was relieved. The final internal diameter of anastomosis was 12.1 mm, the diameter of proximal end was 15.2 mm, the diameter of left and right pulmonary artery was 9.5 mm, the pressure gradients of main-to-left and main-to-right PA were 13 and 17 mmHg, respectively.

**Decision making:** The diameter and the pressure gradient across the stenosis were consistent with the indications for invasive intervention. The patient was at high risk for repeated surgeries, so transcatheter solution was the first choice. Our plan is balloon angioplasty first, then stenting if balloon could not work. Since branch PAs are rather small compared with main PA, single balloon could not stand stably during dilation. So we used double balloon technique. The size of single balloon was determined slightly larger than branch PAs. And they turn out to fit the main PA [ $0.7 (\approx\sqrt{0.5})$  times the diameter].

**Conclusion:** Balloon angioplasty is feasible for anastomotic PA stenosis after initial surgical palliation. Double balloon technique is a better choice for bifurcation lesion with more safety.

ABSTRACTS

PAEDIATRIC CARDIOLOGY FREE PAPER SESSION

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**Life-threatening Flecainide Toxicity related to Alteration of Milk Feeding in an Infant**

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**Background:** Flecainide is a common drug of choice for management of childhood tachyarrhythmias. It is also considered to be a narrow therapeutic index drug.

**Case:** A 6-month-old boy with known atrial tachycardia was hospitalized for three days of gastroenteritis symptoms and reduced milk feeding. Before and during admission, he was on Nadolol, Amiodarone and Flecainide. ECG on admission showed sinus rhythm at 107 bpm with normal PR interval, QRS duration and QTc interval.

36 hours after admission, he developed acute decompensation with bradycardia, hypotension and poor perfusion. There was significant metabolic acidosis with base deficit of 14 mmol/L. Repeated 12-lead ECG showed isorhythmic atrioventricular dissociation and wide complex ventricular escape rhythm at 49 bpm with right bundle branch block pattern.

He was immediately given fluid resuscitation, sodium bicarbonate infusion and high dose inotropic support. All antiarrhythmic agents were discontinued. Over the following 24 hours, we managed to gradually wean off all inotropes. ECG was normalized after 30 hours. Serum flecainide level taken at the time of acute deterioration was 1.44 mcg/ml (reference: 0.2-1.0 mcg/ml), confirming flecainide toxicity.

**Decision Making:** Adverse cardiac effects of Flecainide include negative inotropic action, bradycardia or ventricular tachyarrhythmia, and depression of all major conduction pathways, with typical ECG features of prolongation of PR interval, QRS duration and QTc interval as in our case. Cardiac adverse effects begins to rise at a plasma level of approximately 0.75 mcg/mL and reaches 50% at 1.5 mcg/mL. Increased drug absorption associated with stopping milk feeding had been reported in infants. The long half-life of flecainide (averages 20 hours) may explain the delayed presentation of flecainide toxicity in this infant. CYP2D6 genetic polymorphism and renal dysfunction are other causes of altering Flecainide metabolism and clearance, although these are not demonstrated in our patient.

**Conclusion:** Flecainide toxicity is life-threatening and its pharmacokinetics is inadvertently related to milk intake. Close clinical and cardiac monitoring, or pre-emptive medication adjustment should be contemplated if an infant's milk feeding is significantly altered.

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**Successful Resynchronization Therapy for an Infant with Dilated Cardiomyopathy**

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<sup>1</sup>Department of Paediatric Cardiology, Queen Mary Hospital; <sup>2</sup>Department of Cardiothoracic Surgery, Queen Mary Hospital, Hong Kong

**Background:** Resynchronization therapy for infants with dilated cardiomyopathy is rarely used, with no guideline in patient selection.

**Case:** A 4-month-old infant presented with respiratory distress and cardiomegaly. Echocardiogram found grossly dilated left ventricle with severely impaired contraction. The left ventricular ejection fraction was 13% (LVIDD 5.0 cm). NT-pro BNP was 13,700 pg/ml. Secondary causes were ruled out and anti-heart failure medication was commenced. However, she was readmitted to hospital a month later because of poor feeding and exacerbation of heart failure symptoms.

**Decision making:** Anti-heart failure medication had been maximized and there was no clinical or echocardiographic improvement. Electrocardiogram showed classical left bundle branch pattern. The QRS duration was slightly wide at 120 ms. Left ventricle strain assessment demonstrated ventricular dyssynchrony. Basal anteroseptal myocardium showed earlier contraction than posterolateral counterparts, with pre-stretching at early systole. CRT therapy was thus recommended at her age of 6 month, with implantation of epicardial dual chamber biventricular pacing system. QRS duration was shortened to 98 ms and there was marked improvement in her clinical symptoms

and left ventricular function. 14-month post-CRT implantation showed LVIDD reduced to 2.4 cm and LVEF of 50-54%. NT-proBNP was 876 pg/ml.

**Conclusion:** A subgroup of DCM infant can be benefited from CRT, with appropriate selection using ECG and advanced echocardiography.

## ABSTRACTS

Abstracts for Poster Presentations:

## ABSTRACT POSTER PRESENTATION

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**Meta-analysis of the Incidence of Infections in Clinical Trials Randomizing Patients to Ticagrelor or Clopidogrel**

HL Li, MF Tsoi, Y Fei, Q Feng, BMY Cheung

Department of Medicine, The University of Hong Kong, Queen Mary Hospital, Hong Kong

**Background:** Ticagrelor is a platelet adenosine diphosphate P2Y<sub>12</sub> receptor inhibitor. Recently, it was shown to have antibacterial activity in vitro against Gram-positive bacteria including methicillin-resistant *Staphylococcus aureus* (Lancellotti et al. JAMA Cardiol 2019;4:596-9). In the Platelet Inhibition and Patient Outcomes (PLATO) trial, ticagrelor reduced pneumonia. In the Targeting Platelet-Leukocyte Aggregates in Pneumonia With Ticagrelor (XANTHIPPE) study, ticagrelor improved lung function. We conducted a meta-analysis to investigate if ticagrelor reduces the risk of infections.

**Methods:** We searched MEDLINE, EMBASE, Cochrane Library, and ClinicalTrials.gov for randomized controlled trials up to February 13, 2020 comparing ticagrelor and clopidogrel that have reported the incidence of infections. The primary outcome in our meta-analysis was pneumonia. Secondary outcomes were upper respiratory tract infection (URTI), urinary tract infection (UTI) and sepsis. Risk ratios (RRs) and 95% confidence intervals (CIs) were combined in a random-effects model using RevMan version 5.3.5.

**Results:** Out of 5476 citations, eleven trials with altogether 37569 patients were included in the meta-analysis. Ticagrelor was associated with a lower risk of pneumonia (RR 0.80, 95% CI 0.67 to 0.95) compared to clopidogrel. In contrast, no statistically significant difference was observed for URTI (RR 0.71, 95%CI 0.34 to 1.48), UTI (RR 1.09, 95%CI 0.73 to 1.64), or sepsis (RR 0.79, 95%CI 0.50 to 1.26).

**Conclusions:** There is evidence that ticagrelor reduces the risk of pneumonia compared to clopidogrel. However, there is no significant reduction in URTI, UTI or sepsis. Pneumonia is usually due to Gram-positive pathogens, whereas URTI is usually caused by viruses, and UTI and sepsis are usually caused by Gram-negative bacteria. Our meta-analysis reinforces the post-hoc analysis of PLATO and provides further evidence on the potential benefits of ticagrelor in Gram-positive bacterial infections.

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**Blood and Urine Inorganic and Organic Mercury Levels in the United States: The United States National Health and Nutrition Examination Survey (NHANES) 1999-2016**

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**Introduction:** Mercury is an environmental hazard. Mercury toxicity is highly associated with hypertension, coronary heart disease, myocardial infarction, stroke and other cardiovascular disease. Therefore, we studied recent trends in the blood level of organic and inorganic mercury in the United States.

**Methods:** 56445 participants that had blood mercury and urine mercury measurements in NHANES 1999-2016 were included. The organic mercury level was obtained by subtracting the inorganic mercury level from the total mercury level. Results were analyzed using SPSS complex sample module version 25. Pregnant women and children aged <20 were analyzed as subgroups.

**Results:** Blood inorganic mercury level and urine mercury level have been decreasing between 1999 and 2016 ( $p < 0.001$ ). Blood inorganic mercury level decreased from (geometric mean [95% confidence interval]) 0.31 [0.31-0.31] in 1999-2000 to 0.21 [0.21-0.22]  $\mu\text{g/L}$  in 2015-2016 ( $p < 0.001$ ). Urine mercury level decreased from 0.75 [0.71-0.80] in 1999-2000 to 0.16 [0.16-0.17]  $\mu\text{g/L}$  in 2015-2016 ( $p < 0.001$ ). In contrast, blood organic mercury level increased from 0.08 [0.07-0.10] to 0.17 [0.16-0.18]  $\mu\text{g/L}$  during 1999-2016. Blood organic mercury increased significantly ( $p < 0.001$ ) from 0.03 [0.02-

0.03] to 0.07 [0.06-0.07]  $\mu\text{g/L}$  in children aged <20 and from 0.14 [0.09-0.21] to 0.36 [0.16-0.83]  $\mu\text{g/L}$  in pregnant women in this period.

**Conclusion:** A steady decline in both blood inorganic mercury level and urine mercury level over the period 1999-2016 was observed, suggesting a reduction in environmental pollution by inorganic mercury. The increase in organic mercury, especially in children, adolescents and pregnant women, could be related to changes in consumption of seafood.

## ABSTRACTS

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#### **Reverse Wire Technique for Handling Acute Angle Bifurcation**

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Yan Chai Hospital, Hong Kong

**Background:** Percutaneous coronary intervention (PCI) for bifurcation lesion with angulated side branch is challenging.

**Method:** A 64 year old lady was admitted for late presented anterior ST elevation myocardial infarction. Angiogram showed critical stenosis at proximal left anterior descending (LAD) / first diagonal (D1) bifurcation. The lesion was Medina 1,1,1 classification and the D1 takeoff angle was acute. 6 French Ikari left (IL 3.5) guide catheter via right radial approach was used. The D1, a significant side branch with tight ostial lesion, had a high chance of closure during LAD intervention. The plan was to wire the D1 for protection and for provisional stenting of proximal LAD. After wiring the LAD, repeated attempts to wire the D1 with Sion Blue and Fielder FC supported by microcatheters (Crusade and Supercross 120) were unsuccessful. This is contributed by the angulated takeoff of D1 and tight stenosis before the bifurcation.

**Results:** Subsequently we used the reverse wire technique. A hairpin-bend was formed in the Fielder FC wire at a point 3 cm from the distal tip and inserted in the Crusade microcatheter. The Fielder FC wire was passed via Crusade into LAD beyond the bifurcation. After pulling back the microcatheter, the reverse bent wire was withdrawn slowly which caused

the wire to engage the ostium of D1. After exchanging Fielder FC with Sion wire, the LAD and D1 were predilated. Proximal LAD was provisionally stented with 3.0/19 drug eluting stent. Kissing balloon inflation at LAD and D1 and proximal optimization technique with NC 3.5 balloon was performed.

**Conclusion:** Reverse wire technique is effective and safe for approaching highly angulated branches of bifurcation lesions.

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#### **Leadless Pacing with Micra TPS: Initial Experience at a Regional Hospital in Hong Kong**

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Yan Chai Hospital, Hong Kong

**Background:** Conventional transvenous pacemaker is associated with significant risk of complications, primarily driven by lead related complications.

**Methods:** We describe our initial experience with the Micra Transcatheter Pacing System (TPS; Medtronic) including its indications, efficacy and safety. Clinical data of patients who received Micra in Yan Chai Hospital from March to April 2020 was retrieved and retrospectively analyzed.

**Results:** A total of four patients consented and underwent Micra implant in the above named period. The mean age of the patients was 84.5 +/- 4.6 years, 50% had atrial fibrillation, 75% had diabetes, and 50% had chronic kidney disease. Sinus node dysfunction was the main indication for pacing in this cohort (50%), followed by atrial fibrillation with slow ventricular response and atrioventricular block. No patients had prior device implantation.

The Micra system was successfully implanted in all of the patients. The site of implant was mid right ventricular septum and only one deployment was required in all of the patients. The mean implant duration was 50+/-8.6 minutes and fluoroscopy duration was 7.3+/-2.3 minutes. The average implant threshold was 0.4+/-0.06 mV@0.24 ms, the R wave amplitude was 9.1+/-4.6 mV and impedance 932+/-178 Ohms. None of the patients had high pacing threshold requiring repositioning of the Micra system. There were no major complications during the follow up period.

**Conclusions:** Micra Implantation is a safe and feasible option, especially in patients with multiple risk factors for device infection.

**ABSTRACTS**

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**Short Term Clinical Outcomes and Analysis of Risk Factors for Pacemaker Implantation : A Single Center Experience of Self-expandable Transcatheter Aortic Valves**

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**Background:** Permanent pacemaker (PPM) rates remain high for self expandable TAVI valves. In this analysis we evaluate short term clinical outcomes post self expandable TAVI and determine risk factors for PPM implantation.

**Methods:** 88 patients with severe aortic stenosis with TAVI done between the year 2016-2018 were retrospectively analyzed. Outcomes of interest included 1- year all cause mortality, 30-day major adverse cardiovascular events (MACE), PPM and paravalvular leak rates. Survival analysis was performed with Kaplan Meier analysis and risk factors for survival and PPM rates were identified with log rank test and regression analysis.

**Results:** The mean age of the cohort was 80.3 +/- 6.9 years. The mean STS score was 9.25. The 30 day all-cause mortality was 5.7% and 1-year all cause mortality was 16.7%. 90.1% of patients had transfemoral TAVI, with majority of patients (85.2%) implanted with Corevalve Evolut R device. The device success rate was 88.6%. Multivariate analysis identified concomitant severe coronary

artery disease (OR=18.2 +/- 0.9; P=0.002), pre TAVI atrial fibrillation (OR=8.6 +/- 0.91; P=0.02) and post TAVI disabling stroke ( OR=32.6 +/- 1.35; P=0.01) as risk factors for 1-year mortality. The 30-day PPM rate was 17.6%. The presence of right bundle branch block (OR 11.1 +/- 0.86 ; P = 0.005), non-coronary cusp (NCC) implantation depth (OR=1.34 +/- 0.15; P=0.05) and a NCC implantation depth / membranous septal length ratio of more than 50% were associated with post TAVI PPM (OR=29.9 +/- 1.72; P=0.05). Among the 15 patients with post TAVI PPM, 40% were found to be non-pacemaker dependent at 1 year.

**Conclusion:** Short term outcomes of TAVI in severe AS patients are promising. Pacemaker rates remain high. More studies are needed to evaluate the factors that influence PPM rates and PPM dependence to further improve TAVI outcomes.

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**SMART in Cardiology Nurse Clinic**

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**Background:** Information technology (IT) - based innovations improve health promotion and create more efficient and effective healthcare delivery systems. "SMART" is an IT-based project launched in Cardiology Nurse Clinic - Pre-operative Assessment (CNPA) since 2018. CNPA provides nurse-led assessment for over 650 patients prior to cardiac interventions annually. It comprises, i) initial assessment with laboratory tests and electrocardiogram, ii) health education session, and iii) individual interview with patients and relatives. In 2018, the health education session was modified from 1-hour group talk to introductory videos demonstrated on tablet pc. QR code was developed in 2019 facilitating video preview prior to clinic attendance and sharing to clients' family.

**Objectives:** To review the effectiveness of SMART in CNPA.

**Methods:** Client satisfaction survey was conducted in October and November 2019, incorporate with knowledge assessment with 4 close-ended questions to evaluate clients' knowledge: i) need of fasting on day of cardiac intervention, ii) need of shaving prior to cardiac catheterization/percutaneous coronary intervention, iii) duration of use of dual anti-platelet after drug eluting stent implantation, and iv) storage of glyceryl trinitrate.

**Results:** All clinic attendees (n=108) were invited for the client satisfaction survey with 95% response rate (5% being illiterate). 98% clients agreed that the introductory video clearly disseminated relevant information about cardiac interventions.

QR code facilitates video sharing and education. Over 97% clients agreed that preview of video could effectively minimize consultation time. 73.8% clients had video preview prior to clinic. Clients could watch the video at their convenience, rather than watching at crowded and noisy corridor in clinic. It is worth noticing that 92.1% clients shared the video with their family, whom could not attend the clinic. Health promotion and disease management were expedited among clients and family.

In the knowledge assessment, 86.4% clients scored all correct, revealing that video effectively aided in clients' understanding of cardiac interventional procedures.

**Conclusion:** IT transforms healthcare in new era, allowing more effective exchange of information. With the simple utilization of SMART in Cardiology Nurse Clinic, clients could benefit from shortening of consultation time without health knowledge being compromised. Time conserved also allows more cases to be catered in Cardiology Nurse Clinic.

## ABSTRACTS

Abstracts for Poster Presentations:

## ABSTRACT POSTER PRESENTATION

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**Meta-analysis of Cardiovascular Outcomes in Clinical Trials on Apabetalone**

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**Background:** Apabetalone is a novel drug that reduces inflammation and thrombosis by inhibiting bromodomain and extra-terminal proteins (BET) that regulate transcription. Three phase II trials suggested cardiovascular benefits of apabetalone whereas a recent phase III trial, BETonMACE (Ray et al. JAMA 2020 March 27), failed to show significant benefit. To reconcile these inconsistencies, we performed a meta-analysis of all trials on apabetalone.

**Methods:** MEDLINE, EMBASE, Cochrane Library, and ClinicalTrials.gov were searched for randomised controlled trials of apabetalone up to May 05, 2020. The outcomes of interest were major adverse cardiovascular events (MACE) and hospitalisation for heart failure. The secondary outcomes were death, myocardial infarction (MI), and coronary revascularisation. Risk ratios (RRs) and 95% confidence intervals (CIs) were pooled with fixed-effects model using "meta" package in R (version 3.6.3).

**Results:** Four trials with altogether 3223 patients were finally included. All patients had documented coronary artery disease and received standard statin therapy. The median follow-up duration ranged from 12 weeks to 26.5 months. Apabetalone significantly reduced MACE (RR 0.78, 95% CI: 0.63-0.96) and hospitalisation for heart failure (RR 0.48, 95% CI: 0.33-0.70) compared to placebo. No statistically significant difference was observed for death (RR 0.87, 95% CI: 0.63-1.21), MI (RR 0.82, 95% CI: 0.62-1.10), and coronary revascularisation (RR 0.67, 95% CI: 0.31-1.49). There was no significant heterogeneity among the included trials.

**Conclusions:** Although the BETonMACE trial failed to demonstrate significant benefits, our meta-analysis incorporating evidence from three earlier trials shows that apabetalone may reduce MACE and hospitalisation for heart failure in patients with coronary artery disease. While it is too early to recommend apabetalone for clinical use, larger outcome trials are urgently needed to investigate the benefits of epigenetic modulation through BET protein inhibition.

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**Local Experience in the Use of Proprotein Convertase Subtilisin-Kexin Type 9 (PCSK9) Inhibitors: A Case Series**

SF Wong, TS Chung

United Christian Hospital, Hong Kong

**Background:** Evolocumab and Alirocumab are the current two FDA approved Proprotein Convertase Subtilisin-Kexin Type 9 (PCSK9) inhibitors that were well proven in randomised controlled trials (RCTs) to lower LDL-cholesterol level and reduce cardiovascular outcomes in adjunct to conventional lipid lowering agents. Yet local data regarding their use are lacking. We would like to study on their use in real life practice within the local population and compare the efficacy, dosing regime and side effects profile in contrast to well-established clinical trials.

**Methods:** We reviewed all clinical cases in a tertiary medical centre who were put on PCSK9 inhibitors. All follow-up records of individual case were reviewed and parameters including the LDL-cholesterol levels and any adverse effects in relation to the drugs are analysed.

**Results:** 18 cases are reviewed by far. Among which 7 of them are put on Alirocumab while 11 of them are put on Evolocumab. All cases have a background of atherosclerotic cardiovascular disease and were already put on maximally tolerated dose of statin with or without Ezetimibe before the introduction of PCSK9 inhibitors. All patient have shown a dramatic reduction in LDL-cholesterol levels from a median baseline value of 2.5 mmol per litre to 0.8 mmol per litre over a median follow-up period of 4 months. The cholesterol lowering effect appears to persist despite de-escalating the intensity of therapy with PCSK9 inhibitors. There was no adverse reaction observed so far except from insignificant rise of liver transaminases (i.e. <3x upper limit of normal).

**Conclusion:** Addition of PCSK9 inhibitors on a background of statin therapy significantly lowers LDL-cholesterol level in patients with atherosclerotic cardiovascular disease in our locality, a finding largely comparable to RCTs. The efficacy appears to persist even with doses lower than recommended.



**ABSTRACTS**

Abstracts for Poster Presentations:

**ABSTRACT POSTER PRESENTATION**

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**Transcatheter Tricuspid Valve Replacement and Repair: Pooled Analysis of the Outcomes and Complications of Novel Emerging Treatments**

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**Background:** Tricuspid regurgitation is a poor prognostic marker of end-stage heart failure. Treatment options for severe tricuspid regurgitation are currently limited because these procedures have the highest mortality rates of all valve procedures. Transcatheter tricuspid valve repair or replacement (collectively, TVTT), on the other hand, are extremely promising interventions due to the minimally invasive nature of these treatments.

**Objective:** The aim of this study is to examine the complications of these procedures from day 0 of procedure to up to 1 year of follow up.

**Methods:** Six studies were included from 3 registries (TriVALVE, TRILUMINATE, TRAMI), surveying a total of 336 patients. Complications following the procedures were pooled and analyzed.

**Results:** From procedure to up to 1 year, there was 14.3% mortality (49/342), 0.3% incidence of myocardial infarction and TIA/stroke (1/342), 2% device embolization and/or leaflet detachment (7/342), 5.2% major/minor bleeding (18/342), 0.9% AKI (3/342), 1.1% infections and arrhythmias (4/342).

**Conclusions:** Despite a narrow sample size due to the novelty of these procedures and varying lengths of follow-up (30 days to 1 year), transcatheter tricuspid valve repair and replacement prove to be promising interventions. Mortality was significant at 14.6%, but patients with severe tricuspid regurgitation have a poor prognosis overall without intervention along with higher comparative mortality rates. Research aimed at further investigating TVTT procedures and prospective clinical trials to establish these treatments as mainstays for severe tricuspid regurgitation is necessary.

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**Short Term Outcomes with MitraClip in Women Compared with Men: Evidence From a Meta-Analysis**

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**Objectives:** This study sought to examine short-term outcomes with transcatheter mitralclip in women versus men.

**Background:** MitraClip is now approved for severe functional mitral regurgitation in high-risk patients with contraindications to surgical mitral valve repair. Previous studies have shown conflicting results with respect to sex differences in outcomes with the MitraClip.

**Methods:** Electronic search was performed until April 2020 for studies reporting outcomes with MitraClip in women versus men. Random effects DerSimonian-Laird odds ratios were calculated. Outcomes included all-cause mortality and major cardiovascular events at short-term follow-up (in hospital or 30 days) as well as complications.

**Results:** Six studies (4 MitraClip registries; 2344 patients; 925 women) were analyzed. Women were older but exhibited fewer comorbidities. At 30 days, men had more stroke ( $p < 0.0347$ ) and major vascular complications ( $p < 0.042$ ), without a difference in all-cause and cardiovascular mortality (OR 1.31, 0.67-2.57,  $p < 0.43$ ) compared with men. There was no difference in pericardial effusion/cardiac tamponade ( $p < 0.311$ ) or acute renal failure ( $p < 0.805$ ). However, for 4 of the studies,

female sex was associated with lower all-cause mortality at 1 year ( $p = 0.01$ ), potentially caused by less moderate/severe aortic insufficiency ( $p = 0.001$ ), and lower cardiovascular mortality ( $p = 0.009$ ). The female survival advantage remained consistent across multiple secondary analyses. The risk of stroke, moderate/severe aortic insufficiency, and all-cause mortality seemed to vary based on the type of valve used; however, without significant subgroup interactions.

**Conclusions:** Despite conflicting data, women experience better short-term outcomes with the MitraClip repair.

## ABSTRACTS

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## CASE POSTER PRESENTATION

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**On the Verge of Death: A Case of Fulminant Myocarditis**

YK Yeung

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**Background:** This is a case of fulminant myocarditis with rapid progressing heart failure which is managed by early mechanical circulatory support and guided by invasive hemodynamics.

**Case:** A 48-year-old gentleman had a past medical history of alcohol dependence syndrome. He presented to AED with chest pain and shortness of breath. Initial electrocardiogram showed anterior ST-segment elevation and primary PCI was activated. He was hemodynamically stable when presenting at AED. Upon transferal, he was noted to have fever and unstable hemodynamic requiring inotropic support. On-table echocardiogram showed poor LVEF 30-35% with no regional wall movement abnormalities. Coronary angiography showed normal coronaries. Initial blood work showed normal white cells and differential, normal liver and renal function and elevated hsTnI up to 3465. Chest X-Ray showed normal heart size with no congestion. In view of fever with cardiogenic shock and normal coronary angiography, patient was suspected to have myocarditis. Patient was subsequently transferred to CCU for close monitoring. He was started on empirical antibiotics, intravenous thiamine and inotropic support. On the next day, he had increasing dyspnea requiring oxygen supplement. Chest X-ray showed increased pulmonary congestion and echocardiogram showed deteriorated LVEF to 15-20%. In light of rapid deteriorating hemodynamics

and working diagnosis of myocarditis, early use of mechanical circulatory support was initiated. Right heart catheterization showed elevated mPAP of 30 mmHg and PCWP of 22 mmHg. Endomyocardial biopsy was performed for diagnosis. Impella CP was inserted subsequently. However, patient was further deteriorated with respiratory failure requiring mechanical ventilatory support, acute renal failure and lactic acidosis despite impella support. IVIG was also given. Peripheral VA-ECMO was established and patient was started on hemodialysis. Patient was stabilized with VA-ECMO and Impella for LV venting. Levosimendan infusion was given. There was gradual improvement in hemodynamics and oxygenation. Serial echocardiogram showed improved biventricular function. Decannulation of VA-ECMO and impella removal were performed on Day 9. Patient was subsequently extubated. Follow-up echocardiogram showed normal LVEF 60-65%. Endomyocardial biopsy showed scanty detached necrotic cardiomyocytes with patchy lymphocytic infiltrate.

**Decision making:** This case highlighted the importance on the early recognition of fulminant myocarditis and initiation of mechanical circulatory support including impella and VA-ECMO. It is essential for the maintenance of end-organ, resulting in favorable outcome among which were previously almost universally fatal.

**Conclusion:** Fulminant myocarditis is characterised by rapid hemodynamic deterioration and poor outcome. Early recognition and initiation of mechanical circulatory support are of paramount importance for favorable outcome.

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**A Nightmare: Fractured Rotawire**

V Pong, DKY Lo, CM Kong, SY Man, KW Chan, WHY Lam, NP Kwong

Yan Chai Hospital, Hong Kong

**Background:** Percutaneous coronary intervention (PCI) for heavily calcified lesions can be a nightmare.

**Case:** An 82-year-old lady, good pre-morbid, with diabetes mellitus and hypertension, was admitted for non ST elevation myocardial infarction. Coronary angiogram showed heavily calcified left anterior descending artery (LAD) with mid LAD 80% stenosis. Patient and family were very keen for high risk PCI and accepted the increased risks.

7 French EBU 3.5 guide via right radial approach was used. The mid LAD calcified lesion was undilatable with 1.5 mm balloon and thus proceeded for rotablation. The workhorse wire was exchanged to Rota floppy wire and 1.5 mm burr rotablator was used. During testing of the rotablator advancer outside the body, the wire clip torquer was inserted into the brake docking port instead of gripping the rotawire. Fluoroscopy showed distal rotawire fracture and retention of the radiopaque segment at distal LAD.

**Decision making:** Treatment options included wire retrieval versus crushing the wire against the vessel wall with stent. Twist wire technique to retrieve the retained wire segment was attempted. Two Runthrough wires were placed at distal LAD and one at septal branch. Nevertheless, the technique failed as the rotational torque could not be transmitted through the calcified segment. This was further complicated by proximal LAD dissection while pulling out the twist wire system. Further contrast injection was minimized. Initial wiring with

microcatheter went into a high diagonal branch and eventually the wire was redirected into distal LAD. The mid LAD calcified lesion was aggressively predilated with multiple NC, Angiosculpt and shock wave balloons. The patient required inotropic support for ischemic symptoms during deep seating of guide catheter and Guideliner occlusion of LAD. The retained rotawire segment was crushed with 2.0/38 drug eluting stent (DES) and the proximal LAD was stented with 3.0/38 DES. Subsequent angiogram noted wire perforation at a proximal small diagonal branch with contrast staining. There was no pericardial effusion. The bleeding site was identified by balloon testing and 3.5/15 covered stent was deployed at ostial LAD. Final angiogram was good. The patient gradually weaned inotropes and had an uneventful postoperative recovery.

**Conclusions:** Fracture and retention of rotawire is a very rare complication and can be safely treated by stenting the wire. Always follow the checklist before activating the rotablator.

## ABSTRACTS

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### CASE POSTER PRESENTATION

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#### Too Young to Die

SSM Wong, PT Tsui

Princess Margaret Hospital, Hong Kong

**Background:** Mr. Chung was a male 39 years old diabetic with nephropathy and retinopathy. He defaulted follow up from 2014-2018 and had been admitted because of buttock necrotizing fasciitis and Fournier gangrene with poor wound healing. Transverse colostomy was performed for de-functioning purpose. He was admitted to PMH in December 2019 because of unresponsiveness and shock and then transferred to ICU for inotropic support and CRRT. Cardiac team was consulted because of two episodes of PEA arrest in ICU (downtime 9 + 3 min). He was intubated and his ECG showed ST elevation over II, III and ST depression over V2-4. Echo showed LVEF <40% and global hypokinesia.

**Case:** Emergency PPCI was performed to RCA. He developed PEA arrest again during PCI and required transient LUCAS support. Staged PCI to LM and LAD was then performed with Impella 2.5 support. Procedure was uneventful with only transient hypotension treated by Impella boosted support. Continued Impella support via LFA was provided for 4 days. The LFA was not pre-closed. Impella driveline was punctured and guidewire was passed into abdominal aorta. The whole system was then advanced to the thoracic aorta and the guidewire was then freed from the Impella driveline. Two Proglide sutures were applied. After hemostasis, cross over angiogram showed blocked LFA. Attempted PTA to LFA failed. Surgical exploration and clot evacuation was performed. He developed severe left groin wound infection requiring multiple debridement surgery.

#### Decision making:

1. Impella versus IABP support for staged PCI to LCA
2. Manual compression versus Proglide for LFA not preclosed
3. What caused LFA total occlusion? Sutures or thrombus

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#### Broken Arrow

YH Cheng

Pok Oi Hospital, Hong Kong

**Background:** CTO PCI is a complicated procedure requiring a wide repertoire of skill sets as well as numerous equipment. Unfortunately, the success rate for CTO PCI still remains lower than conventional PCI while having a higher chance of complication. Here, we present a case with a complication involving equipment failure and a novel method to tackle it.

**Case:** Mr. M, a 75-year-old gentleman presented with stable angina He was brought in for coronary angiogram as well as percutaneous coronary intervention. Diagnostic coronary angiogram showed mLAD CTO with a blunt stump. The CTO was eventually crossed with Gaia Second supported by Caravel microcatheter.

However, the Caravel microcatheter failed to advance through the lesion. Further manipulation of the microcatheter yielded no progress. Upon withdrawal of the microcatheter, the tip of the microcatheter broke off and was stuck inside the mLAD lesion.

**Decision making:** We decided to try using Rotablation to destroy the tip. A Rotawire was passed through the lesion, through the tip of the microcatheter and a 1.25 mm burr was used to rotablate the broken Caravel

tip as well as the CTO lesion at 160 000 rpm with multiple passes. Further balloon dilatation and the mLAD lesion was stented with TIMI 3 flow achieved.

**Conclusion:** To our knowledge, this is the first case to use Rotablation for successfully bailing out a retained device inside a coronary lesion.

ABSTRACTS

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CASE POSTER PRESENTATION

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**"Double Sieve" in Coronary Intervention**

KC Un, AYT Wong, FCC Tam  
Queen Mary Hospital, Hong Kong

**Background:** We present a case of rotablation complicated by coronary perforation and our subsequent management.

**Case:** YM Au, F/70, with history of hypertension and diabetes, presented to the medical ward with NSTEMI. TnT rose to 1354. Echo showed normal LVEF. Coro showed p-mRCA 90% disease, pLCx 70-80% disease, mLAD 60-70% disease. In view of triple vessels disease, coronary surgery was offered to patient but was declined. PCI to RCA was then performed with rotablation and two DES was implanted. Stage PCI to left coronary arteries was performed afterwards. IVUS was unable to advance into LAD/LCx due to tight calcified stenosis and tortuosity. Rotablation to LAD was performed with 1.5 Burr and 1.25 Burr. Angiogram and IVUS showed contained rupture (Class I perforation) at pLAD. mLAD was then stented and LM-LAD-LCx bifurcation stenting was performed over the perforation. Stent at pLAD was post-dilated with NC 3.0. Subsequent angiogram showed static perforation and no extravasation.

**Decision making:** In view of static pseudoaneurysm size, patient was put on close observation. CABG with surgical repair may not be optimal in view of small distal vessel. Cover stent was also not the first option in view of close proximity with septal and diagonal branches. Reassessment CT coro one month later showed static coronary pseudoaneurysm sizes.

However reassessment coro two months later showed interval increase in size of the pseudoaneurysm. IVUS also showed increase in pseudoaneurysm size with LAD stent undersizing and malapposition. A Bare metal stent was implanted and post-dilated with NC 3.0 and NC 3.5. Covered stent was considered to be the next option if restudy coro showed further increase in size of the pseudoaneurysm. Subsequent coronary angiogram three months later showed interval decrease in size of the pseudoaneurysm and was resolved six months later.

**Conclusion:** This case illustrated our approach towards coronary pseudoaneurysm as a serious complication after rotablation. Extra care should be taken during rotablation process and we should be well-prepared to tackle the potential complications.

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**Challenges and Solutions from a Very Elderly Patient in Renal Insufficiency: Atrial Flutter With Congestive Heart Failure And Acute Deep Venous Thrombosis**

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**Background:** Both atrial flutter and deep venous thrombosis require anticoagulation therapy, but there are no reports or guidance for the very elderly with renal insufficiency.

**Case:** The 88-year-old male patient with upper abdominal pain for four days was admitted to the surgical ward. After admission, the patient was transferred to the cardiac unit due to an atrial flutter attack. The patient has a history of palpitation and shortness of breath after activity for more than three years and renal dysfunction more than four years without any medications. He denied a history of hypertension, diabetes, stroke, and coronary heart disease. He has a 50 pack-year history of smoking. The patient still could take good care of himself. Physical signs showed R 28, BP132/94 mmHg, HR 136 beats/min. Tenderness under xiphoid positive, swollen legs and a.

**Examination result:** NT-pro-BNP 7575.00 pg/mL, SCr: 164.40 umol /L, Body Weight 42 Kg, eGFR 16.35 ml/min, D-dimer: 1728 ng / ml, EKG showing Atrial flutter (typical), 2: 1 conduction. HOLTER showing persistent atrial fibrillation and frequent ventricular premature beats (6.2%). The echocardiography appeared as mitral regurgitation (moderate to severe), aortic regurgitation (mild), tricuspid regurgitation (severe), pulmonary hypertension (mild), right

atrium enlargement, EF24%, left ventricular wall Widely weakened. lower limb venous vein echo appeared as the intermuscular vein of the right calf muscle vein thrombosis widened to 3 mm.

**Decision making:** (1) What are the main complaints and diagnoses of the patient? (2) What is the differential diagnosis according the clinical situation? (3) What is the decision for anticoagulant therapy? (4) How to perform rate control therapy? (5) Whether should we perform ablation to maintain rhythm? (6) What are the ablation risks to the patient? Finally, the 88-year-old patient underwent ablation and anticoagulation. EF value was up to 69% with persistent sinus rhythm after three months follow-up, and echo showed the right calf muscle vein thrombosis in the limb has gone.

**Conclusion:** The treatment indications should be strictly grasped to improve the prognosis and quality of life for very elderly patients. Elderly patients with tachycardia cardiomyopathy can benefit from sinus rhythm maintenance, and anticoagulants can also be safely and effectively used for the very elderly atrial flutter with comorbidity of deep vein thrombosis and chronic kidney disease.

**ABSTRACTS**

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**CASE POSTER PRESENTATION**

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**A Rare Case of Acute Cerebral Embolism from Left Atrial Myxoma Complicated by Postoperative Atrial Fibrillation**

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**Background:** Primary cardiac tumors are those that originate in the heart and are extremely rare. Myxomas are the most common form of primary cardiac tumors. They have a variety of presentations, such as constitutional symptoms, cardioembolic events like cerebrovascular accidents (CVA), or hemodynamic abnormalities. Paroxysmal atrial fibrillation (PAF) is a well-known postoperative complication of coronary artery bypass grafting (CABG), but there are extremely few cases of PAF occurring post-operatively after left atrial myxoma surgical resection.

**Case summary:** We present a case of a 69-year-old female with a history of subarachnoid hemorrhage (SAH) who was diagnosed with CVA secondary to thromboembolism from left atrial myxoma. She then developed atrial fibrillation which required cardioversion.

**Discussion:** This case presents a challenge in terms of keeping left atrial myxoma as part of the differential diagnosis for cardioembolic CVA; deciding optimal timing for surgical resection; and finally, how to manage the subsequent new-onset atrial fibrillation.

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**A Rare Case of End-stage HF Salvaged by Rescue Cardiac Resynchronization Therapy (CRT)**

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<sup>1</sup>Rowan University; <sup>2</sup>Syracuse University, USA

**Background:** End-stage heart failure (HF) is defined as lack of improvement of HF symptoms and frequent exacerbations despite maximal medical therapy. Current guidelines recommend against the use of Cardiac Resynchronization Therapy (CRT) as a rescue device in end-stage HF.

**Case report:** We present a case of an unconventional approach using CRT to treat refractory end-stage HF. A 76-year-old male presented with two days of worsening shortness of breath, hallucinations, and confusion.

A transthoracic echocardiogram (TTE) showed an EF of 20-25% with globally reduced wall motion function. The patient was restarted on his home medications and given intravenous (IV) lasix, which improved the patient's mental status and generalized edema. However, his creatinine increased, and nephrology recommended holding his sacubitril/valsartan and carvedilol due to persistent hypotension. He was then noted to have worsening dyspnea on exertion, episodes of hallucinations, and confusion. The patient was intubated and upgraded to the intensive care unit due to increased work of breathing with hypoxia. He was diagnosed with end-stage HF and cardiogenic shock based on clinical and physical exam findings of cool extremities, altered mental status, and decreasing heart rate. He was started on dobutamine and norepinephrine infusions with improvement in all of his clinical symptoms.

After three days, the patient was extubated, but he could not be weaned from the dobutamine infusion. Palliative care recommended home hospice with a palliative dobutamine infusion. A repeat EKG showed worsening LBBB now with QRS 213 ms.

**Decision making:** Electrophysiology recommended CRT with a defibrillator because the patient met EKG criteria for the device with a wide QRS of 230 ms and a LBBB. After CRT, the patient was hemodynamically stable with cessation of the dobutamine infusion. His kidney function continued to improve on the day of discharge - the lowest it was noted in years. He was also able to restart all of his goal directed medical therapy. After discharge, a repeat TTE showed an improved EF of 30-35%.

**Conclusions:** CRT is a promising intervention for new-onset end-stage HF for patients who may be able to recover enough of their EF to restart GDMT. This report highlights the promising clinical outcome of an unconventional CRT use in end-stage HF despite a level C recommendation in current guidelines. Further studies are required to validate these findings and to establish the causes of these observations.

**ABSTRACTS**

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**6**

**Clinical Study of Blunt Cardiac Rupture in Childhood: A Report of 5 Cases**

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**Background:** Cardiac injury is among the most lethal lesions in human history. Patients would inevitable die until 1882. It first report that Dr. Ludwig Rehn successful sew the broken heart. Recently, most people agree that a prompt diagnosis and suitable treatment can save lives. However, there is no widely acceptable golden standard diagnostic test. It is difficulty to quantify on how to establish the diagnosis. In western country database, we usually find that most cardiac trauma happens at youth (age around 30 years). leading cardiac injury caused including motor vehicle accident, gunshot wounds, stab wounds. Consider the anatomical site of lesions, two ventricle was the most affect site.

Compared with their data, our hospital patients have their special features. It is worthy to conclude and research.

**Method:** During the 10 years, we collect data from 5 patients, age around 4-to-9 years old. 4 patients are female. All of them suffered blunt cardiac injury. Two of them injury caused by heavy object acting on chest, NO.1 is medal stairs, NO.2 is heavy gate. NO.3, NO.4 catches the drifting-down injury (drop from 2th floor). NO.5 injury by fast speed motorcycle accident. Cardiac tamponade happen in all patients. The heart-shock happen in all patients. Echocardiography shows large fluid in pericardium. Jugular veins are distend. Chest X-ray reveal a widened mediastinum. The hemodynamic stability at origin. Usually the systolic blood pressure trend down slowly.

**Result:** We finally transport all patients to operation room. By making the median sternum incision, blood and clot were seen in the pericardial space. Reassure the diagnosis hemo-pericardium. All 5 patients damage site around right atria from their connections to the super vena cava. Usually the surgeon can use small satinsky clamp stop bleeding then sew it by prolene suture. They all recover soon after the emergency operation. During the follow up research, all data go back to normal.

**Conclusion:** In China, limit by the transport and experience protocol of trauma patients. penetrating cardiac rupture patients usually die at scene. For the blunt cardiac injury patients, the most easy rupture site is around the svc and right atrium. Without CPB, surgeon can sew it. It is based on prepare the diagnosis view.

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**N-terminal Pro-brain Natriuretic Peptide as a Biomarker for Predicting Coronary Artery Lesion of Kawasaki Disease**

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**Background:** Coronary artery lesion (CAL) caused by Kawasaki disease (KD) is currently the most common acquired heart disease in children in many countries. Nevertheless, there is no single useful marker existing for predicting CAL of KD. Recently, many reports have noted that N-terminal pro-brain natriuretic peptide (NT-proBNP) can be utilized as a biomarker to predict CAL. Thus, we perform a meta-analysis to ascertain the diagnostic value of NT-proBNP in detecting CAL of KD in the acute phase.

**Methods:** PubMed, the Cochrane Central Register of Controlled Trials, EMBASE, and China National Knowledge Infrastructure were searched to detect relevant publications. Meta-Disc 1.4 was utilized to perform data analysis. Besides, STATA 15.1 (Stata Corporation, College Station, Texas, USA) was utilized to assess the publication bias and perform meta-regression analysis. Homogenous results utilized the random-effects model for statistical analysis, while the heterogeneous (I<sup>2</sup> <50%) results utilized a fixed-effects model, and the data were presented using a forest map.

**Results:** Finally, eight eligible studies were included. The overall diagnostic sensitivity and specificity were 0.84 (95% confidence interval [CI]: 0.78-0.89) and 0.71 (95% CI: 0.68-0.75), respectively. The area under the summary receiver operating characteristic curves value (SROC) curve was 0.8582±0.0531. Moreover, the overall sensitivity and specificity across five studies adopted the threshold of approximately 900 ng/L were 0.82 (95% CI: 0.73-0.89) and 0.72 (95% CI: 0.68-0.76), respectively. SROC was 0.8868±0.0486.

**Conclusion:** This meta-analysis would be the first one to describe the role of NT-proBNP in detecting CAL of KD.

ABSTRACTS

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**Diagnostic Significance of Circulating MiRNAs in Kawasaki Disease**

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**Background:** As the most common cause of acquired heart disease in children in developed countries, there is still no golden standard available in diagnosing Kawasaki disease (KD). With the rapid development of molecular biology, many studies concentrated on the association between the microRNAs (miRNAs) and the risk of KD. Thus, we perform this meta-analysis to find out the role of circulating miRNAs as a biomarker in detecting KD.

**Methods:** We searched PubMed, EMBASE, the Cochrane Central Register of Controlled Trials, and China National Knowledge Infrastructure through Mar 10th, 2019. We conducted a meta-analysis in a fixed/random-effect model using Meta-disc 1.4 and STATA 15.1.

**Results:** Six eligible articles were included in this meta-analysis. The overall performance of total mixed miRNAs (TmiRs) detection was: pooled sensitivity, 0.7 (95% confidence interval [CI], 0.66 to 0.74); pooled specificity, 0.87 (95%CI, 0.83 to 0.90); and area under the summary receiver operating characteristic

curves value (SROC), 0.8302. The meta-regression analysis suggested that the specimen types, the composition of the control group, and types of the reference miRNA were not responsible for the existing heterogeneities. The subgroup analysis showed that SROC of the plasma group (0.8890) was more significant than the serum group (0.7204), and SROC of the non-healthy control (non-HC) group (0.9622) was more significant than the HC group (0.8096).

**Conclusions:** This is the first meta-analysis show that miRNAs may be used as novel biomarkers for detecting KD, especially for distinguishing KD from other febrile diseases. Besides, plasma is recommended as the clinical specimen for diagnostic detection.

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**Significance of Platelet Function and Parameters in Kawasaki Disease**

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**Background:** Kawasaki disease (KD) is a systemic febrile, inflammatory vascular disease of unknown etiology. The coronary artery abnormality (CAA) caused by KD has become the most commonly acquired heart disease in children. Initial treatment of intravenous immunoglobulin (IVIG) can reduce the incidence of CAA. Thrombocytosis is common during the course of KD, but changes in and significances of platelet function and parameters are unclear.

**Methods:** In this study, we enrolled 120 patients, including 40 patients with KD, 40 febrile controls, and 40 afebrile controls. The platelet function was assessed using the platelet function analyzer (PFA)-200. Platelet parameters, including platelet count (PLT), mean platelet volume (MPV), platelet distribution width (PDW), and platelet hematocrit (PCT) were measured.

**Results:** In the febrile period, the PDW and MPV were lower in KD patients (P<0.05). The platelet function did not change significantly during the febrile period of KD but weakened in the defervescence phase. No significant differences between the CAA and normal groups, and between IVIG resistance and response groups. The diagnostic cutoff value of the PDW level for predicting KD was 10.85fL with a sensitivity of 55% and a specificity of 77.5% (area under curve (AUC)=0.690, 95% confidence interval (CI): 0.574-0.806, P

<0.01). Besides, the MPV level was 9.55fL with sensitivity of 75% and specificity of 70% (AUC=0.733, 95%CI: 0.620-0.846, P<0.001).

**Conclusion:** This is the first longitudinal study of platelet function changes in KD patients using PFA-200. Besides, lower PDW and MPV may be available markers for early diagnosis of KD.

## ABSTRACTS

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**Efficacy of Infliximab for the Treatment of Kawasaki Disease**X Zheng,<sup>1,2</sup> Y Li<sup>1,2</sup>

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**Background:** Kawasaki disease (KD) is an acute vasculitis of unknown cause which predominantly affects children. Coronary artery lesions (CAL) are a severe complication of KD. Initial treatment with intravenous immunoglobulin (IVIG) can reduce the incidence of CAL. Approximately 10-20% of KD patients are resistant to the primary IVIG (rKD). Infliximab may decrease the rate of CAL and rKD. We performed this meta-analysis to evaluate the efficacy of infliximab for the treatment of KD.

**Methods:** Studies related to infliximab for the treatment of KD were selected from PubMed, EMBASE, the Cochrane Central Register of Controlled Trials, and China National Knowledge Infrastructure through May 24th, 2019. STATA Version 15.1 was used for meta-analysis fixed/random-effects estimates.

**Results:** We included nine articles in this meta-analysis. No significant differences were recorded between groups in the incidence of CAL (risk ratio (RR), 0.97; 95%CI (0.72, 1.31); p=0.84), the maximal Z-score of either coronary artery (Zmax) (the mean standard deviation (SMD), 0.19; 95%CI (-0.28, 0.65); p=0.43), the rate of rKD (RR, 0.65; 95%CI (0.39, 1.09); p=0.10), the days of

hospital (SMD, -0.82; 95%CI (-2.06, 0.42); p=0.20), and the rate of severe adverse events (SAEs) (RR, 1.18; 95%CI (0.70, 2.00); p=0.53). Meanwhile, subgroup analysis showed infliximab had no effect on the incidence of CAL either as an initial treatment for KD or as a treatment for rKD.

**Conclusion:** Infliximab is not associated with reductions in the incidence of CAL, rKD, days of hospital, and SAEs in KD patients. Further well-designed randomized and prospective clinical trials with a larger number of patients are needed to evaluate the efficacy of infliximab.

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**Cellular Functional and Transcriptomics Study in Gene Mutations Associated with Congenital Heart Defects**HX Chen,<sup>1</sup> ZY Yang,<sup>2</sup> HY Wang,<sup>2</sup> HT Hou,<sup>1</sup> J Wang,<sup>1</sup> Q Yang,<sup>1</sup> GW He<sup>1,3,4,5</sup>

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**Purpose:** Congenital heart defects (CHD) is the most common congenital anomaly in newborns. The causes of CHD are complex and not fully understood. A number of genetic studies have linked gene mutations to cardiac abnormalities. In this study, the stable human pluripotent stem cell (hPSC) lines with two mutations identified from a patient with complex CHD were established. We aimed to investigate the possible pathways and pathogenic mechanism of CHD in mRNA levels using transcriptomics study.

**Methods:** Two novel mutations (LTBP2 c.2206G>A, TCTN3 c.1268G>A) were identified from the CHD case by whole exome sequencing (WES) in previous study. The CRISPR/Cas9 system was used to generate hPSCs with mutations (hPSCsmut) separately. The hPSCsmut cells were

then induced and differentiated into cardiomyocytes (CMsmut). RNA sequencing technology was performed to detect the differentiation efficiency and contraction of CMsmut and identify pathways involved in CHD in day 0, 9, 13.

**Result:** The stable hPSCs-LTmu/TCmu were established, then induced and differentiated into CMs (hPSCs-CMs-LTmu/TCmu). Compare to the wild type (hPSCs-CMswt), there were no significant differences in cell pluripotency and differentiation efficiency. The cell contraction was observed in the 8th day and lasted to the 13rd day, the contraction of hPSCs-CMs-LTmu was faster and hPSCs-CMs-TCmu was slower than hPSCs-CMswt. Transcriptomics analysis showed that the most significant changes occurred in hPSC-CMs-TCmu group, 77 genes were down-regulated in day 0 and 2321 genes were down-regulated in day 13, compared with hPSCs-CMswt. In contrast to the changes of gene expression pattern of persistent up-regulation in the group hPSCs-CM-LTmu, there was no persistent up-regulated expression pattern in group hPSCs-CM-TCmu.

**Conclusion:** Base on cell model (hPSCs-CMs-LTmu/TCmu) in vitro, transcriptomics analysis suggested that LTBP2/TCTN3 mutations affect genes expression in mRNA levels, some pathways in cardiac development were enriched. These two mutations also affect contractility (rate and force) of cardiac myocytes and may affect the development of the heart. These findings provide new insights into the pathogenesis of CHD.



**ABSTRACTS**

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**Re-evaluation of the Criteria for Asymmetric Amplatzer Occluders in the Closure of Perimembranous Ventricular Septal Defects: A Case Series Report**

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**Objective:** To discuss suitable criteria for the application of asymmetric Amplatzer occluders for perimembranous ventricular septal defects (pmVSDs).

**Methods:** We retrospectively studied 18 children with perimembranous VSDs who underwent attempted asymmetric occluder closure between January 2015 and December 2018 in our center. We analyzed the diameter of the defects with the receiver operating characteristic curve (ROC) values, the size of the occluders attempted, the presence of aneurysm and the presence of aortic valve prolapse for each patient. Then, for patients who experienced successful device implantation, the therapeutic efficiency was evaluated by follow-up.

**Results:** Only 5 out of a total of 18 patients completed successful device implantation. Compared with failed cases, successful cases demonstrated a significantly smaller VSD size ( $5.46 \pm 1.03$  mm vs.  $8.73 \pm 2.33$  mm,  $P=0.012$ ) and had a low ratio of aortic valvar prolapse (20% vs. 76.92%,  $P=0.026$ ). Four out of 5 successful cases involved arrhythmia complications, but the rhythm of the heart recovered after drug treatment. According to the ROC and Youden analyses, the cut-off value of the defect size for successful asymmetric Amplatzer occluder implantation was no larger than 5.7 mm.

**Conclusion:** The application of an asymmetric Amplatzer occluder expands the range of indications for patients with superior localized VSD but is largely limited in cases with aortic valvar prolapse and large VSD sizes. All successful cases recovered from arrhythmia postprocedure.

**43**

**Gene Therapy for Hypertrophic Cardiomyopathy Targeting mir-133 Using AAV System**

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**Background:** Hypertrophic cardiomyopathy (HCM) is an autosomal incomplete dominant hereditary disease, with the asymmetrical hypertrophic of ventricular, disorder arrangement of muscle bundle and fibrosis. Owing to shortage of effective treatment, the majority of HCM patients could only choose to heart transplantation for live at the advanced stage of disease, which caused a heavy burden for the patients of HCM, and their family, even the society. Therefore, focusing on the mechanisms of HCM to find an effective target is becoming more and more urgency.

**Methods:** The mice under general anesthesia were opened the abdomen and isolated the abdominal aorta. Ligation with a rod of 0.26 mm diameter was taken for abdominal aortic constriction. Four weeks after the operation, immunofluorescence staining of myocardial tissue was used to evaluate the morphology, size and arrangement of myocardial cells. The expression levels of NPPA, NPPB, mir-133 and CTGF were detected by RT-PCR. Mice were injected with AAV-mir-133, AAV-mir-133-inhibitor or AAV-GFP at P0 days, and the cardiac function of mice was detected by small animal high-frequency echocardiography at P54 days. Double luciferase reporter plasmid was used to verify the downstream target gene of mir-133.

**Results:** By TAC surgery or inhibiting the expression of mir-133, ultrasonic results showed that the heart LVPW was thickened in mice. Immunofluorescence staining of myocardial tissue and single cardiomyocytes showed hypertrophy of cardiomyocytes. The results of RT-PCR showed that the expression level of NPPA was significantly increased after TAC surgery or inhibiting the expression of mir-133. The dual luciferase reports showed that mir-133 could inhibit the expression of CTGF to repress the cardiac hypertrophy. The results of ultrasonic and immunofluorescence staining of myocardial tissue and single myocardial cell were showed that the thickness of LVPW decreased and the area of single myocardial cell decreased after the mice received TAC when overexpression mir-133 by AAV9 vector.

**Conclusion:** Using AAV system could successfully repress or over express the expression of mir-133, and overexpression of mir-133 could alleviate myocardial hypertrophy induced by TAC surgery, via inhibiting the expression of CTGF, which suggested mir-133 could be a potential target for HCM treatment. The study successfully supply a new target for gene therapy of HCM by using AAV system.

**ABSTRACTS**

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**PAEDIATRIC CARDIOLOGY**

**1 Percutaneous Occlusion for Right Pulmonary Artery – Left Atrium Fistula: A Case Report**

X Zhang

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**Background:** A five-year-old girl was presented to our center as cyanosis and a rare congenital fistula from right pulmonary artery (PA) to left atrium, the physical examination showed mild developmental delay with body weight of 16 kg. Severe cyanosis was noted with clubbed fingers, the percutaneous oxygen saturation was 0.63, a 2/6 degree systolic murmur was heard at 2-3 intercostal area of the left border of sternum.

**Case:** A secondary polycythemia was noticed with an elevated hematocrit (0.51), which clearly was the result of chronic hypoxia. The echocardiography showed a RPA-LA fistula. The entrance of the fistula from the RPA was 9.4 mm, and the stenosis of the fistula was 6.4 mm. Heart catheterization and angiography demonstrated that the fistula originated from the distal portion of RPA and continued to the posterior wall of LA. The RPA joint of the fistula was the narrowest point with a diameter of 5.6 mm. The mid-portion of the fistula had ball-shaped expansion with the diameter of 18.3 mm. An 8 mm Cera™ Atrial Septal Occluder was sent from the right femoral vein, across the right atrium, the right ventricle, and the main and right PA, to close the fistula at the RPA joint without any influence to the RPA blood flow. The oxygen saturation elevated to 0.92 after occlusion. Aspirin was prescribed for 6 months. Follow-up echocardiography showed good early results.

**Decision making:** The prominent cyanosis was consistent with the indication for invasive intervention. The special anatomy of the fistula made transcatheter

solution possible. However, complications (e.g. RPA obstruction) should be avoided. The size of device should be 2-4 mm larger than the stenosis of the fistula.

**Conclusion:** Percutaneous occlusion of the rare congenital right PA – left atrium fistula is safe and efficacious. The short term result is good. Long term follow-up is needed.

**2 Percutaneous Dilation for Anastomotic Stenosis after Warden Operation: A Case Report**

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**Background:** A four-year-old girl was presented as prominent chest wall varicosis. Her initial diagnosis was partial anomalous pulmonary venous connection / atrial septal defect, with first stage "Warden operation" on September 2016. Since June 2019, her chest wall superficial veins became dilated and progressively aggravated.

**Case:** The echocardiogram showed that anastomosis between the superior vena cava (SVC) and the right atrial appendage (RAA) was stenosed. The diameter was 3.8 mm, the velocity of blood flow was 2.2 m/s. Cardiac catheterization confirmed the diameter of anastomosis as 3.0 mm. Left innominate vein was 7.5 mm, right innominate vein was 9.4 mm, azygous vein, semiazygous vein and accessory semiazygous vein were patent. 10 mm x 20 mm BALT balloon catheter was selected to dilate the narrowest position for 3 times with the maximum pressure allowed. The stenosis was relieved after dilation, with the diameter of the anastomosis enlarged to 7.6 mm, the left innominate vein 6.4 mm, and the right innominate vein 8.8 mm. Echocardiography showed normal velocity at the anastomosis. The chest wall varicosis disappeared after intervention.

**Decision making:** The diameter of the stenosis and the symptoms were consistent with the indications for invasive intervention. The patient was at high risk for repeated surgeries, so transcatheter solution was the first choice. Our plan is balloon angioplasty first, then stenting if balloon could not work. **Conclusion:** Balloon dilation is safe and efficacious for anastomotic stenosis of SVC after Warden operation.



**Victoza® — to prevent cardiovascular events<sup>1,2</sup>**



**Proven to prevent cardiovascular events<sup>1,2</sup>**



**Unsurpassed HbA<sub>1c</sub> reductions<sup>3-9</sup>**



**Unsurpassed weight reductions<sup>3-9</sup>**

**Victoza®: One agent addresses both HbA<sub>1c</sub> and cardiovascular (CV) risk<sup>1-9</sup>**



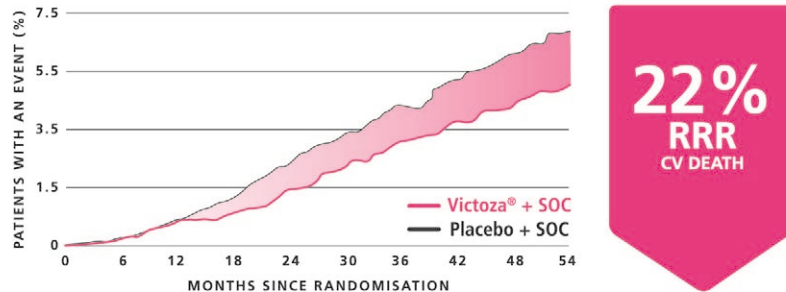
**For adult with type 2 diabetes and established CVD  
ADA/EASD consensus report recommends  
GLP-1 RA therapy with proven CV benefit<sup>10</sup>**

In patients with type 2 diabetes and high CV risk<sup>1</sup>

## Victoza® provided a significant life-saving cardiovascular benefit<sup>1</sup>

Victoza® significantly reduced the risk of major adverse cardiovascular events (MACE) by 13% ( $P=0.01$ ). The composite primary end point included:

### Cardiovascular death ( $P=0.007$ )



Hazard ratio, 0.78 (95% CI, 0.66-0.93)

**Nonfatal MI  
HR 0.88 ( $P=0.11$ )**

**Nonfatal stroke  
HR 0.89 ( $P=0.30$ )**

<sup>1</sup> High cardiovascular risk was defined as 50 years with at least 1 coexisting cardiovascular condition or 60 years with at least 1 cardiovascular risk factor as determined by the investigator

#### Abbreviated prescribing information

**Victoza®** (liraglutide injection)

**Indications:** Victoza is indicated for the treatment of adults with insufficiently controlled type 2 diabetes mellitus as an adjunct to diet and exercise as: Monotherapy: when metformin is considered inappropriate due to intolerance or contraindications. **Combination therapy:** in addition to other medicinal products for the treatment of diabetes. **Dosage and administration:** The starting dose is 0.6 mg once daily. After at least one week, the dose should be increased to 1.2 mg. Based on clinical response and after at least one week, the dose can be increased to 1.8 mg to further improve glycaemic control. In combination with metformin with or without a thiazolidinedione, no dose adjustment is required. Blood glucose self-monitoring is necessary to adjust the dose of sulfonylurea and insulin, particularly when Victoza® therapy is started and insulin is reduced. A stepwise approach to insulin dose reduction is recommended. Victoza® can be used without dose adjustment in elderly patients (>65 years of age). No dose adjustment is required in patients with mild, moderate or severe renal impairment. No dose adjustment is recommended for patients with mild or moderate hepatic impairment. Victoza® can currently not be recommended for use in patients with end-stage renal disease or severe hepatic impairment. Victoza® is administered once daily at any time, independent of meals, and can be injected subcutaneously in the abdomen, thigh, or upper arm. Victoza® should not be administered intravenously or intramuscularly. **Contraindications:** Hypersensitivity to the active substance or any of the excipients. **Special warnings and precautions:** Victoza® should not be used in patients with type 1 diabetes mellitus or for the treatment of diabetic ketoacidosis. Victoza® is not a substitute for insulin. Diabetic ketoacidosis has been reported in insulin-dependent patients after rapid discontinuation or dose reduction of insulin. There is no therapeutic experience in patients with congestive heart failure New York Heart Association (NYHA) class IV and Victoza® is therefore not recommended for use in these patients. Due to limited experience, Victoza® is not recommended for use in patients with inflammatory bowel disease or diabetic gastroparesis. Acute pancreatitis has been observed with the use of GLP-1 receptor agonists. Patients should be informed of the characteristic symptoms of acute pancreatitis. If pancreatitis is suspected, Victoza® should be discontinued; if acute pancreatitis is confirmed, Victoza® should not be restarted. Thyroid adverse events, such as goitre, have been reported in clinical trials and in particular in patients with preexisting thyroid disease. Liraglutide should therefore be used with caution in these patients. Patients receiving liraglutide in combination with a sulfonylurea or insulin may have an increased risk of hypoglycaemia. Patients treated with Victoza® should be advised of the potential risk of dehydration in relation to gastrointestinal side effects and take precautions to avoid fluid depletion. Pregnancy and lactation: Victoza® should not be used in women who are pregnant, who wish to become pregnant, or who are breastfeeding. **Undesirable effects:** The most frequently reported adverse reactions in patients treated with Victoza® are nausea and diarrhoea. Common adverse reactions include nasopharyngitis, bronchitis, hypoglycaemia, anorexia, decreased appetite, headache, dizziness, increased heart rate, vomiting, dyspepsia, upper abdominal pain, constipation, gastritis, flatulence, abdominal distension, gastroesophageal reflux disease, abdominal discomfort, toothache, rash, injection site reactions, increased lipase and increased amylase. Since the market introduction of Victoza®, allergic reactions and dehydration (sometimes with a decrease in kidney function) have been reported. **Overdose:** From clinical trials and marketed use overdoses up to 40 times (72 mg) the recommended maintenance dose have been reported. Generally, the patients reported severe nausea, vomiting and diarrhoea. None of the patients reported severe hypoglycaemia. All patients recovered without complications.

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