

What's New in MCS Literature Review

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1. *** Early diagnosis of Acquired Von Willebrand Syndrome (AVWS) is Elementary for Clinical Practice in Patients Treated with ECMO Therapy. Kalbhenn et al. Journal of Atherosclerosis and Thrombosis. 2015;22:265-271**

This is a simple yet informative study looking at 18 patients who underwent ECMO for respiratory failure, and 18 controls. Ratio of collagen binding capacity to VWF-antigen was used to diagnose AVMS. In all patients this occurred rapidly by 1 day of support. Bleeding complications were also present in 17/18 patients. Post ECMO this ratio improved rapidly back to normal.

2. *** Comparative RNA-sequencing analysis of myocardial and circulating small RNAs in human heart failure and their utility as biomarkers. Akat et al. PNAS July 29, 2014 vol. 111 no. 30 11151–11156.**

MicroRNAs (miRNAs) are small strands of RNA that are able to downregulate target mRNAs, and so can influence expression of proteins. In this study the authors looked at myocardial and circulating miRNAs in patients (47 patients, 68 samples) with advanced heart failure, stable heart failure (due to ischemic heart disease and idiopathic dilated cardiomyopathy), and controls without heart failure and also fetal samples. Advanced heart failure samples were obtained in patients undergoing VAD implantation and at time of explant.

Myocardial miRNAs were not significantly different between those with ischemic heart disease and non-ischemics, and there was no difference before and after LVAD. The authors found that in myocardial tissue, the miRNA comprised alterations of miRNA cistrons mir-1-1, mir-195), mir-199a-1, mir-199b, and mir-221. Of interest, the mir-1-1 genes are induced during heart development and act as central regulators of muscle differentiation.

With respect to circulating miRNAs – these largely originated from hematopoietic or endothelial cells, and those from the heart contributed to only 0.1% in healthy controls and patients with moderate and stable HF. In advanced heart failure this percentage increased to over 1%, and miRNAs were reduced 3 and 6 months after LVAD implantation. Of interest the levels of myocardial miRNAs (called myomirs) correlated with circulating levels of TnI, suggesting that these are released as a consequence of cardiac myocyte injury. Higher levels of the heart-specific myomirs mir-208a, mir-208b, and mir-499 were positively correlated with cTnI ($R = 0.75$, $P = 4.73 \times 10^{-6}$; $R = 0.76$, $P = 4.59 \times 10^{-7}$; and $R = 0.6$, $P = 8.86 \times 10^{-5}$, respectively) but not

correlated with BNP. The authors concluded that analysis of circulating miRNAs may be a useful biomarker for heart failure, though currently the methodology is too slow to be of clinical use at present without further developments.

3. Principles of HeartMate II Implantation to Avoid Pump Malposition and Migration. Adamson et al. J Card Surg 2015;30:296-299.

Adamson and colleagues identified 4 key principles to obtain and maintain optimal HeartMate II pump and cannula positioning and prevent pump migration. There were: 1) Deep pump pocket: It is important to make the pocket inferiorly deep and sufficiently lateral so that the inflow cannula and pump in its final position do not push upward against the Heart; 2) Inflow cannula parallel to septum: The inflow cannula should lie parallel to the apical portion of the interventricular septum and aim toward the center of the LV; 3) Outflow graft avoids RV compression; 4) Pump position and fixation: The pump should be positioned below the diaphragm in the preperitoneal pocket, approximately perpendicular to the spine, and inferior to and parallel with the acute margin of the RV, with the inflow cannula roughly parallel to the septum and at an angle of approximately $15^{\circ}\pm 30^{\circ}$ from the vertical axis.

4. Chronic Implantable Mechanical Circulatory Support 50 Years Later: Still Shooting for the Stars! M. S. Slaughter. Ann Thoracic Surgery, Volume 99, Issue 3, March 2015, Pages 749–751

In this invited editorial to commemorate the 50th anniversary of the Annals of Thoracic Surgery, Dr Slaughter reviews an article from that 1st volume by Zuhdi and colleagues entitled "Assisted Circulation—The Concept of The Implanted Bypass Heart". This article was pioneering in setting out concepts for mechanical circulatory support, and included the correct prediction that an LVAD "presents many theoretical and practical advantages" over a total artificial heart.