

### Metabolomic profiling as a promising tool to identify biomarkers in Fontan patients

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**Objectives:** Metabolomics is the study of small organic molecules processed along biochemical pathways. Using this technique to analyse minute biospecimens, novel candidate biomarkers for heart failure have been identified. Up to now little is known about metabolism in Fontan patients. We aimed to analyse the metabolic pattern in adult Fontan patients with a left dominant ventricle.

**Methods:** We determined the metabolic pattern of 20 adult Fontan patients with a dominant left ventricle, and 20 age and gender matched healthy biventricular controls, using a 0,5 ml serum sample each and the BIOCRATES AbsoluteIDQ p180 kit. Between groups we compared metabolite concentrations of the protein and lipid metabolism.

**Results:** Compared to biventricular controls, in Fontan patients serum phosphatidylcholines and sphingomyelins were significantly decreased ( $q < 0.05$ ), while the modified proteins methionine-sulfoxide (Met-SO,  $q < 0.001$ ) and asymmetric dimethylarginine (ADMA,  $q = 0.0018$ ) were significantly increased.

**Conclusions:** There is a distinct metabolic pattern indicating structural membrane alterations (decreased phosphatidylcholines and sphingomyelins), oxidative stress (increased Met-SO), and alteration in NO-dependent signalling processes (increased ADMA) in Fontan patients with a systemic left ventricle. Requiring minute amounts of biospecimens to analyse multiple metabolic pathways simultaneously, metabolomic profiling is useful for the assessment of metabolic derangement, possibly delivering a promising tool to identify biomarkers for the Fontan circulation.