

Towards predicting cardiac function during veno-arterial extracorporeal life support



Severe heart and/or lung failure has a high mortality rate. In patients unresponsive to conventional treatment, short-term mechanical life support is a last resort. Venous-arterial extracorporeal life support (VA-ELS) is a short-term support system in the form of a minimized heart-lung machine.

Even with VA-ELS less than 50% of patients survive. Clinical management can be difficult since knowledge on optimal support settings is limited. Both too little and too much support are detrimental. A patient-specific mathematical model could aid clinicians in determining ideal pump settings. To this end, in vitro measurements were performed to obtain pump characteristics. Additionally, a clinical trial was designed to obtain patient data for model verification.

Since no continuous measurements on cardiac output during VA-ELS were available, a new method was designed based on previous research performed by perfusionists at the MUMC+. This method looks at the reaction that patients have to small variations in pump settings. Besides serving as input and verification for the model, an objective and continuous measurement of the cardiac function on itself already aids clinical decision-making. Currently the clinical trial is including the last patients.



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