

Multisystem Inflammatory Syndrome in Children (MIS-C): Special Theme Session at Functional Imaging and Modeling of Heart FIMH 2021

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Title: Towards augmented monitoring of cardiovascular physiology through biophysical modelling and data assimilation

Abstract: The care of patients under general anaesthesia requires a careful monitoring of their cardiovascular state on which therapeutic strategies can be based. In particular, unstable haemodynamics during general anaesthesia must be avoided. It is indeed associated with an increased risk of cardiac, renal and brain dysfunctions during the postoperative period, thus leading to a higher level of morbidity and mortality. In the standard practice, no information about the heart is available although it is the engine of the cardiovascular system. To overcome this issue, our project proposes to develop an augmented monitoring tool for anaesthesia. The technology will introduce into the monitoring loop a predictive biophysical model, simulated in real time, and fed by the routinely measured physiological signals. The model will be personalised for the patient creating a digital twin of the patient's cardiovascular system. With this digital twin, physiological information that cannot be measured or that can only be obtained with highly invasive methods will be computed in real time and treatment recommendations will be made. With our system, we hope to provide a much more complete vision of the patient's cardiovascular state and allow more informed and faster decisions. We envisage that such an approach can be adapted also to the augmented physiological monitoring at Intensive Care Unit, such as for patients in cardiovascular shock such as at acute stage of Multisystem Inflammatory Syndrome in Children (MIS-C, PIMS-TS).