**Presentation Tittle:** Control of partial pressure of $CO\_{2}(P\_{a,CO\_{2}}) $ up to ∼40 mmHg

 in human cardiovascular and respiratory system Under an ergo metric workload

**Author Name:** Dr .Mustafa Habib

**Affiliation:** University of Engineering &Technology Lahore, Pakistan

**Phone Number:** 0923467221027

**Email ID’s:** mustafa@uet.edu.pk

**WhatsApp No: 0923467221027**

**Any alternative number: 0923453938066**

**Presentation type: Oral**

**Abstract:**

The human cardiovascular system (CVS) and respiratory system (RS) work together in order to supply oxygen ($O\_{2}$) and other substrates needed for metabolism and to remove carbon dioxide ($CO\_{2}$). Global and local control mechanisms act on the CVS in order to adjust blood flow to the different parts of the body. This, in turn, affects the RS since the amount of $O\_{2}$ and $CO\_{2}$transported, respectively to and away from the tissues depends on the cardiac output and blood flow in both the systemic and pulmonary circuits of the CVS. Local metabolic control is influenced by local concentrations of blood gases affecting systemic resistance, resulting to vasoconstriction/vasodilation. Thus, the exchange of blood gases demands a tight coordination between blood flow and ventilation of the lungs. In this work, a fractional optimal control model for cardiovascular and respiratory system under a non-constant ergo metric work load described by system of fractional differential equations to tightly control the partial pressure of $CO\_{2}(P\_{a,CO\_{2}}) $ up to ∼40 mmHg is considered . The model is formulated in terms of the left and right Caputo fractional derivatives. Optimality system for the solution of the above problem is derived using Pontryagin’s maximum principal. The forward-backward sweep method with generalized Euler scheme will be applied to numerically compute the solutions of the optimality system.

**Biography:**

The author of this presentation has done PhD in Bio-Mathematics from the University of Graz Austria in 2001. The Project was related with mathematical modelling of cardiovascular and respiratory system. Then again in 2018, author went to Graz for the follow up grant up to three months and carried out the research, which he intends to present in the conference. With the new approach involving fractional derivative, modelling result were more near to reality data than the study carried out in 2011.