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Parameter Estimation for the Oral Minimal Model and Parameter Distinctions Between Obese and Non-obese Type 2 Diabetes

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Abstract : Oral Glucose Tolerance Test (OGTT) is the primary test used to diagnose type 2 diabetes mellitus (T2DM) in a clinical setting. Analysis of OGTT data using the Oral Minimal Model (OMM) along with the rate of appearance of ingested glucose (Ra) is performed to study differences in model parameters for control and T2DM groups. The differentiation of parameters of the model gives insight into the behaviour and physiology of T2DM. The model is also studied to find parameter differences among obese and non-obese T2DM subjects and the sensitive parameters were co-related to the known physiological findings. Sensitivity analysis is performed to understand changes in parameter values with model output and to support the findings, appropriate statistical tests are done. This seems to be the first preliminary application of the OMM with obesity as a distinguishing factor in understanding T2DM from estimated parameters of insulin-glucose model and relating the statistical differences in parameters to diabetes pathophysiology.

Keywords : oral minimal model, OGTT, obese and non-obese T2DM, mathematical modeling, parameter estimation
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