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**Phospholipase A2 Activity in Ins-1 $\alpha$  Cells and Diabetic Patient Leukocytes: Impact of Disease Severity and Omega-3 Dietary Intervention**

Duaa Hatem<sup>1</sup>

<sup>1</sup> Università Cattolica del Sacro Cuore Sede di Roma, Rome, Italy

Phospholipase A2 (PLA2) is a key enzyme involved in phospholipid hydrolysis, releasing arachidonic acid, the precursor of eicosanoids-critical lipid mediators of inflammation-thus initiating inflammatory cascades. Tracking PLA2 activity offers insights into inflammation linked with diabetes and related complications. This study examined PLA2 activity in INS-1E pancreatic beta cells after exposure for 24 and 48 hours to serum concentrations (10% and 20%) from patients with type 1 diabetes mellitus (T1DM), type 2 diabetes mellitus (T2DM), and T2DM with cardiovascular complications. Additionally, the effect of dietary intervention rich in omega-3 fatty acids on PLA2 activity was assessed in white blood cells (WBCs) from T2DM patients. PLA2 activation was measured using a ratiometric fluorophore, alongside membrane fluidity assessment via Laurdan generalized polarization (GP) using confocal microscopy. Preliminary results revealed a significant concentration- and time-dependent increase in PLA2 activity in INS-1E cells, particularly elevated in cells exposed to serum from T2DM patients with cardiovascular complications. Importantly, omega-3-rich dietary intervention substantially reduced PLA2 activity in WBCs from T2DM patients, suggesting dietary strategies might effectively decrease inflammation and improve clinical outcomes in diabetes.