

S37-6 Metabolomics of omega-3 polyunsaturated fatty acids and inflammation

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Clinical assessment of dietary supplementation of omega-3 polyunsaturated fatty acid (PUFA) including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) indicate their beneficial impact in certain human diseases such as cardiovascular disease and particularly those in which inflammation is suspected as a key component in pathogenesis. Also an increased omega-3 PUFA levels in omega-3 desaturase (*fat-1*) transgenic mice that endogenously biosynthesize omega-3 PUFA from omega-6 led to effective protection against inflammation and tissue injury. Omega-3 PUFAs are widely held to act via several possible mechanisms, such as preventing conversion of arachidonic acid to pro-inflammatory eicosanoids, or serving as an alternative substrate producing less potent products. Recently, systematic metabolomic analyses of lipid mediators using LC-MS/MS in the course of acute inflammatory responses revealed that omega-3 PUFA-derived mediators are generated within resolving exudates, including resolvin E1 from EPA and protectin D1 from DHA. These mediators are generated *in vivo* by sequential lipoxygenase and/or cytochrome P450 monooxygenase reactions, and proved to be potent inhibitor of neutrophil infiltration, cytokine production, and promote resolution of inflammation by increasing macrophage ingestion of apoptotic cells and clearance from exudates. These results established novel arrays of bioactive lipid mediators derived from omega-3 PUFA that regulate acute inflammation and promote resolution.