The effects of tomato extract (TE) and omega-3 fatty acids on platelet cAMP levels and inositol triphosphate (IP_3) release

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Background – Blood platelets play a major role in the development and stability of atherosclerotic plaques. Pharmacological antiplatelet therapies have been shown to decrease the incidence of cardiac events. Dietary strategies aimed at reducing platelet activity are needed.

Objectives – To determine whether the combination of TE and ω-3 fatty acids inhibits platelet aggregation *in vitro* to a greater extent than either treatment alone and whether the mechanism of inhibition is by increasing cAMP levels or inhibiting the release of IP_3.

Design – Platelet rich plasma was incubated with buffer (control), TE (30 μL), eicosapentaenoic acid (EPA, 5 μM), docosahexaenoic acid (DHA, 2.5 μM), EPA plus TE or DHA plus TE for 15 min at 37ºC. cAMP levels were determined using an enzyme immunassay kit. IP_3 release was determined after 1 min of stimulation with ADP (5 μM) using a radioimmunoassay kit. Platelet aggregation was monitored for 5 min after stimulation with ADP (5 μM).

Outcomes – Platelet aggregation was inhibited by TE (39.2%, $P=0.01$), EPA (24.3%, $P<0.05$), DHA (16.4%, $P=0.13$), TE + EPA (68.4%, $P<0.001$), TE + DHA (71.7%, $P<0.001$). The extent of inhibition of platelet aggregation was significantly correlated with platelet cAMP levels ($R^2=0.742$, $P=0.027$). EPA tended to inhibit IP_3 release ($P=0.2$), while DHA had no effect. Unexpectedly, TE caused a significant increase in IP_3 release ($P=0.01$).

Conclusions – The combination of TE and ω-3 fatty acids inhibited *in vitro* platelet aggregation to a greater extent than either alone and this inhibition was correlated with platelet cAMP levels. Human intervention studies should be conducted in order to determine whether the anti-aggregatory benefits can be observed following consumption.