Modulation of platelet function *in vitro* by sulforaphane

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Introduction: Platelets, leukocytes, and endothelial cells each play an important role in various pathologies involving an inflammatory response such as atherosclerosis, myocardial infarction and stroke[1]; and more recently, the interaction between these key players has become more apparent [2]. Sulforaphane (SFN) is a naturally occurring isothiocynate derived from cruciferous vegetables which has been previously shown to alter the inflammatory phenotype of endothelial cells and leukocytes during various inflammatory settings [3]. However, to our knowledge, its effects on platelets in isolation have not been previously documented.

Aim: To investigate the effect of sulforaphane on platelet activation.

Methods and Results: Using light transmission aggregometry agonist induced aggregation responses in human platelets were studied [4]. Using washed platelets, incubation for 30mins and 2mins with varying doses of SFN (100-1µM) platelet aggregation responses to 2.5µg/ml collagen were studied. Significantly decreased aggregation was seen at 40, 60 and 100µM of SFN following 30mins incubation periods (100 vs. 1.36, 9.13, 27.1 respectively as % aggregation by area under the curve compared to collagen alone) and at 100µM following 2mins incubations in response to collagen (100 vs. 25.26 % aggregation by area under the curve compared to collagen alone). Aggregatory responses in platelet rich plasma to ADP 1.56µM showed similar trends however these were not significant (n=4/5, ANOVA + Tukeys Multiple Comparison Test). $[Ca^{2+}]i$ measurements in Fura-2 loaded human platelets indicated that no cell signalling was activated following addition of 100µM SFN. Furthermore, an acute LDH assay indicated that any effects of SFN on platelet function were not due to platelet cytotoxicity, as LDH release was lower than that caused by both thrombin (0.1U/ml) and ADP1.56µM.

Conclusion: Sulforaphane is capable of inhibiting platelet aggregation to collagen *in vitro*, and trends indicate that it may also have some inhibitory effects on ADP activated aggregation. An acute LDH assay suggested that these effects are not due to cytotoxic effects. What is more, SFN's effects do not seem to be owing to cell signalling activation due to the lack of activated Ca^{2+} signalling. Overall, these novel anti-inflammatory effects of SFN via direct effect on platelets provides potential clinical implications in inflammatory pathologies such as atherosclerosis, myocardial infarction and stroke.

References:

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