

The effect of vegetarian and omnivorous diets on platelet function and haemostatic factors

N Mann¹, D Li¹, F Kelly¹, A Turner², AJ Sinclair¹

¹Dept of Food Science, RMIT, VIC 3001

²Dept of Medical Laboratory Science, RMIT, VIC 3001

The aim of this study was to investigate whether habitual dietary intake influences platelet function and the blood level of the selected coagulation factors. Fibrinogen strongly affects blood rheology, coagulation and platelet aggregation. In addition fibrinogen has direct effects on the vascular wall and is a prominent acute-phase reactant. Fibrinogen together with factor VII have been claimed as strong and independent risk factors for occlusive vascular disease (1). Antithrombin III is a major inhibitor of blood coagulation and its deficiency is associated with thrombotic disease. Platelets play a pivotal role in occlusive diseases, as arterial thrombi form around a platelet aggregate.

One hundred and forty three male healthy subjects aged 20-55 years were recruited in the metropolitan area of Melbourne. According to their habitual dietary intake they were divided into four groups: vegan (n = 18), ovo-lacto vegetarian (n = 44), moderate-meat-eaters (n = 61, <300g meat/day) and high-meat-eaters (n = 20, >300g meat/day). Venous blood was collected into citrate vacutainers for the analysis of plasma coagulation factors and whole blood platelet aggregation. The blood coagulation parameters, prothrombin time (PT), activated partial thromboplastin time (APTT), antithrombin III, plasminogen, fibrinogen and factor VII were measured using an ACL 200 coagulation instrument. Whole blood platelet aggregation was measured using a Chrono-Log whole blood aggregometer, with collagen and ADP as agonist. The results are shown in the table.

	Vegan ¹	Ovo-lacto ¹	Moderate-meat ¹	High-meat ¹
Prothrombin time (INR)	0.99 ± 0.06	1.00 ± 0.10	0.97 ± 0.08	0.97 ± 0.01
APTT (S)	35.0 ± 2.4	35.8 ± 4.1	35.7 ± 3.6	35.9 ± 3.2
Antithrombin III (%)	90 ± 10	91 ± 11	91 ± 11	93 ± 13
Plasminogen (%)	95 ± 12	100 ± 15	103 ± 15 ^{acf}	102 ± 11
Fibrinogen (g/L)	2.78 ± 0.56	2.83 ± 0.69	2.94 ± 0.68	2.73 ± 0.44
Factor VII (%)	89 ± 14	96 ± 19	103 ± 19 ^{acg}	99 ± 23 ^{af}
Platelet aggregation (Ω)				
Collagen (2 µg/ml)	17.5 ± 3.7	17.6 ± 3.4	15.7 ± 2.4 ^{bcg}	15.4 ± 3.1 ^{*g, bdf}
ADP (17 µM)	9.2 ± 2.1	9.0 ± 3.9	7.5 ± 3.2 ^{acf}	6.7 ± 3.4 ^{*f, adf}

¹mean ± SD

*Anova: ^fP<0.05. ^gP<0.01. ^hP<0.001.

^{ac}vegan vs moderate-meat. ^{ad}vegan vs high-meat. ^{bc}ovo-lacto vs moderate-meat. ^{bd}ovo-lacto vs high-meat. T-test

There was no significant difference between the four groups in prothrombin time, APTT, Antithrombin III and fibrinogen. The level of plasminogen was significantly higher in the moderate meat eater groups than in the vegan group (P<0.05). The level of factor VII was significantly higher in the moderate meat eater group than in the vegan group (P<0.01). Collagen- and ADP-induced platelet aggregation were significantly higher in both the vegan and ovo-lacto vegetarian groups, than in the high and moderate meat eater groups (P<0.05).

These results suggest that vegan and vegetarian diets enhance platelet reactivity relative to diets containing meat, while having a lowering effect on the clotting factor VII. Further studies are required to isolate the specific dietary factors responsible for these differences.

- 1 Mead TW, Brozovic M, Chakabarti RR, Haines AP, North WRS, Stirling Y, Thompson SG. Haemostatic function and cardiovascular death: early results of a prospective study. *Lancet* 1980;1:1050-4.