

## Aqueous tomato extract inhibits platelet aggregation

SA Lazarus<sup>1</sup>, AK Dutta-Roy<sup>2</sup>, ML Garg<sup>1</sup>

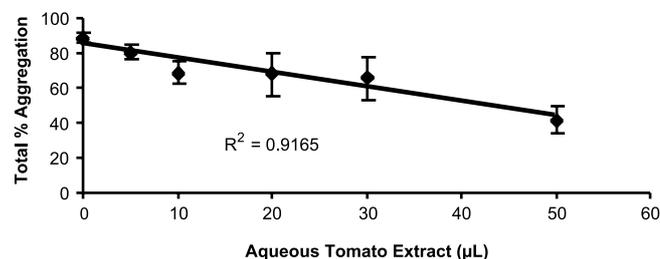
<sup>1</sup>Nutrition & Dietetics, University of Newcastle, NSW, 2308

<sup>2</sup>Institute for Nutrition Research, University of Oslo, Norway, N-0316

Epidemiological data have revealed a relatively low incidence of heart disease in Italy and other Mediterranean countries that cannot be entirely accounted for by traditional risk factors and have identified tomatoes as a component in the diet that may help explain the protective effect observed (1). Indeed, data have inversely correlated blood levels of lycopene, of which tomato products contribute approximately 80% to the diet, to incidence of acute coronary events, development of early atherosclerosis, and mortality from heart disease (2–3). Blood platelets play an important role in the development and stability of plaques. Recently, the presence of anti-platelet factor(s) in tomatoes has been reported (4). However, the active components in tomatoes and mechanism of their anti-platelet action are still unknown. To this end, the purpose of the present study was to determine the extent to which an aqueous tomato extract could inhibit collagen-induced platelet aggregation *in vitro*.

Fasting blood samples were collected into sodium citrated tubes from healthy volunteers who had not taken medications known to affect platelet function for the previous seven days. Platelet-rich plasma was obtained by centrifugation and the platelet counts ( $1.5\text{--}4.0 \times 10^8$  per mL) determined by microscopy using a hemocytometer. Platelet aggregation was measured following the addition of PBS (pH 7.4) or incubation with the aqueous tomato extract for 15 minutes using a dual channel optical aggregometer (Chronolog).

The aqueous tomato extract inhibited platelet aggregation induced by collagen ( $2 \mu\text{g/mL}$ ) in a dose-dependent manner ( $R = -0.95733$ ,  $P = 0.003$ ), and the amount of aqueous tomato extract required to inhibit aggregation by 50% ( $IC_{50}$ ) was determined to be  $51 \mu\text{L}$  in the  $500 \mu\text{L}$  reaction system (see Figure). The addition of  $40 \mu\text{L}$  of aqueous tomato extract significantly inhibited collagen-induced platelet aggregation ( $P = 0.007$ ), with the amount of collagen required to achieve 50% aggregation ( $EC_{50}$ ) in the presence or absence of aqueous tomato extract being  $1.05$  and  $0.34 \mu\text{g/mL}$ , respectively.



These data demonstrate that an aqueous tomato extract can inhibit platelet aggregation *in vitro*, and may provide an explanation for the cardioprotective effects of tomatoes observed in epidemiological studies. Further research is in progress to determine whether these effects can be demonstrated following intervention with tomato products.

### References

1. Parfitt VJ, Rubba P, Bolton C, Marotta G, Hartog M, Mancini M. A comparison of antioxidant status and free radical peroxidation of plasma lipoproteins in healthy young persons from Naples and Bristol. *Eur Heart J* 1994; 15: 871–6.
2. Klipstein-Grobusch K, Launer LJ, Geleijnse JM, Boeing H, Hofman A, Witteman JC. Serum carotenoids and atherosclerosis. *The Rotterdam Study. Atherosclerosis* 2000; 148: 49–56.
3. Rissanen TH, Voutilainen S, Nyyssonen K, Lakka TA, Sivenius J, Salonen R, Kaplan GA, Salonen JT. Low serum lycopene concentration is associated with an excess incidence of acute coronary events and stroke: the Kuopio Ischaemic Heart Disease Risk Factor Study. *Br J Nutr* 2001; 85: 749–54.
4. Dutta-Roy AK, Crosbie L, Gordon MJ. Effects of tomato extract on platelet aggregation *in vitro*. *Platelets* 2001; 12: 218–27.

Supported by the University of Newcastle.

Key words: tomato, platelet aggregation, cardiovascular disease