
The relationship between platelet function and bleeding tendency was studied in 42 patients undergoing open heart surgery. Template bleeding time (TBT) and hourly chest tube outflow were measured as indices of bleeding tendency. Platelet function tests included platelet count (PC), aggregation with epinephrine, ADP, and collagen, and a modified platelet slide adhesion test (PSAT) which allowed us to quantitate in vivo the relative amount of more adhesive platelets, i.e., the "spread" form, as compared to the number of smaller non-adhesive platelets. Postoperatively the PC decreased 36% (from 214.1 ± 11.4 K to 136.3 ± 6.8 K, p=0.001) in all patients irrespective of the amount of blood loss. Using the PSAT, the product of the 6 spread forms and the PC showed a significant 57% decrease (from 110.5 ± 7.4 K to 47.4 ± 4.6 K, p=0.001) which was 19% more than the PC decrease implying that the more adhesive platelets had been expended. TBT increased significantly (7.7 ± 0.5 min. to 17.7 ± 1.3 min., p=0.001) and aggregation to epinephrine decreased significantly (69.9 ± 4.8% to 56.0 ± 5.4%, p=0.001), but no significant change was noted with ADP or collagen. There was no significant difference in the above parameters between patients bleeding more than 115 cc/hr. from 1 to 5 hrs. post op (N=14) and those bleeding less (N=28). A second study of 16 patients with bleeders having >1000 cc output in the first 4 hrs. post op showed results similar to the first group comparing pre vs. post and bleeders (N=8) vs. non-bleeders. This study indicates that after cardiopulmonary bypass surgery platelet function is frequently compromised and this dysfunction though probably contributing to a bleeding tendency did not correlate well with the magnitude of blood loss.


The contribution of platelets to the cardiovascular effects of ADP was investigated in rats in different experimental conditions. Following rapid i.v. bolus injections of ADP (from 0.001 to 0.03 mg/kg b.w.) only a dose-related fall in blood pressure could be detected. Increasing the duration of ADP (up to 1 mg/kg b.w.), platelet fall and changes in cardiac rhythm (bradycardia, A.V. blocks and ectopic beats) became evident. All these phenomena were rapidly reversed. Inhibition of platelet aggregation by a pyridine- pyridazine compound (EH 869) or thromboxanease inhibitor by benzafirin or antiplatelet antagonist did not significantly protect the animals from the cardiovascular effects of ADP. The fall in blood pressure, however, was reduced. Adenosine, at equimolar concentrations, caused EEG changes similar to those induced by ADP with no platelet aggregation and a less pronounced blood pressure fall. These results suggest that most of the cardiovascular modifications induced by rapid injection of ADP are largely independent of platelets. Platelets appeared to play a more important role when ADP was given for a longer period of time. A slow i.v. infusion of ADP (6 mg/kg b.w. for 30 min) was accompanied by platelet fall, cardiovascular collapse and EEG alterations typical of myocardial ischemia. All these effects persisted throughout the ADP infusion but disappeared soon after its termination. They were almost completely inhibited in rats given EH 869 or made thromboxytopenic.

In conclusion, platelets seem to contribute to the cardiovascular effects of ADP only in certain experimental conditions. In others, the nucleotides' direct effects seem more important.

EFFECTS OF ETHANOL ON PLATELET SEROTONIN METABOLISM. D. H. Cowan and P. Shook. Case Western Reserve University, Cleveland, Ohio, U.S.A.

The metabolism of serotonin (5-HT) in platelets is altered in several mental disorders and by various neurotransmitters. Since ethanol impairs the function of both nerves and platelets, the effect of ethanol on 5-HT metabolism was studied in normal platelets and in platelets from patients ingesting ethanol. Ingestion of ethanol by 3 subjects produced blood ethanol levels of 65-76 mg%. Platelet 5-HIAA activity in each decreased by 50% and platelet serotonin levels increased 50-100%. Ethanol, incubated with normal platelets in vitro, competitively inhibited 5-HIAA activity. With phenylethylamine as substrate, the Km of 5-HIAA was 23 µM and the Ki of ethanol was 33 µM. With tyramine, Km and Ki were 94 µM and 571 µM, respectively. 5-HT uptake by platelets increased 50-100% during ethanol ingestion over control values. By contrast in vitro addition of ethanol to normal platelets inhibited initial 5-HT uptake by 65% and Ki were 5.000% and 89.6% respectively. The efflux of 5-HT from platelets was 3-5 times control values during ethanol ingestion and with addition of ethanol to normal platelets. Acaldehyde, at a concentration of 2 µM did not alter 5-HIAA activity or 5-HT uptake or efflux. The inhibitory effects of ethanol on 5-HIAA and 5-HT uptake were not altered by reseptine, aspirin, or tricyclic antidepressants. The results indicate that ethanol substantially alters 5-HT metabolism by normal platelets. Inhibition of ethanol of 5-HIAA activity and 5-HT transport may contribute to ethanol-induced platelet and neuronal dysfunction.