

**Title:** PLATELET FUNCTION IN HUMANS FOLLOWING INHALATION ANESTHETICS OR FENTANYL

**Authors:** P. Fyman, M.D., L. Triner, M.D., Ph.D.\*, H. Schranz, M.D., L. M. Abrams, M.D., P. A. Casthely, M.D., W. Boyle, M.D.\*, and J. E. Cottrell, M.D.

**Affiliation:** Departments of Anesthesiology, SUNY/Downstate Medical Center, Brooklyn, New York and Columbia-Presbyterian Hospital\*, New York, New York

**Introduction.** There has been conflicting data in the literature as to whether various inhalational anesthetics impair platelet function. This study, approved by the Institutional Review Board, was undertaken to determine what effects inhalational or intravenous anesthetic agents have on in-vivo platelet function.

**Methods.** Forty patients, consenting to the study, without prior bleeding problems, not taking antiplatelet drugs, with normal PT, PTT, CBC, and platelet counts, were studied. None had received blood transfusions preoperatively or during the study. The patients were randomly assigned to one of four groups: 1. N<sub>2</sub>O-0<sub>2</sub>-fentanyl; 2. halothane-100% O<sub>2</sub>; 3. enflurane-100% O<sub>2</sub>; 4. isoflurane-100% O<sub>2</sub>. General anesthesia was induced with thiopental 3-4 mg IV, succinylcholine 100 mg, or pancuronium 0.1 mg/kg IV; after which the anesthesia drugs were begun. Standardized bleeding times were measured using Simplate II bleeding time Device (General Diagnostics) before induction of anesthesia and repeated approximately 40 minutes after a constant concentration of inhalation agent was achieved. Blood pressure was maintained at  $\pm$  20% of control values. Normothermia was also maintained. The second bleeding time was performed prior to the surgical incision. The same area of the forearm was used for all measurements using identical techniques. Each patient served as his/her own control and the results were evaluated using the two-tailed Student's "t" test for paired comparison.

**Results.** The bleeding time was significantly prolonged, by 40% in the halothane group, while the prolongation in the N<sub>2</sub>O-fentanyl group, by 20%, was not statistically significant. The bleeding times in patients receiving enflurane or isoflurane were not different from the respective control values (Table). There was considerable variability within each group, which does not seem to correlate with difference in sex, age, type of surgery, or concentration of agent used.

**Discussion.** A significant prolongation of the bleeding time occurred during halothane anesthesia in our study. These results are consistent with the findings of Dalsgaard-Nielsen<sup>1</sup> and Stengert<sup>2</sup> as well as with a recent report of decrease in platelet aggregation and platelet adenyl cyclase activation after halothane in-vitro.<sup>3</sup> This data indicates an impairment of platelet aggregation during halothane anesthesia which prolongs bleeding. Other factors, however, such as altered regional perfusion or hormonal changes may also contribute to prolongation of bleeding time. The seemingly contradictory data from other studies may be explained by differences in methodology, namely, collection, storage, or processing of blood specimens.

In summary, halothane prolongs bleeding time most likely by impairing platelet function. This may be clinically significant in patients with prior qualitative platelet defects. These abnormalities may be congenital, such as Von Willebrand's Disease, thrombasthenia, and Bernard-Soulier Syndrome; or acquired, such as in dysglobulinemia, uremia; or drug-induced following aspirin, or nonsteroidal anti-inflammatory drugs. This halothane-induced platelet abnormality may impair hemostasis which is especially critical during intracranial, intraocular, or tubular plasty surgery.

#### References.

1. Dalsgaard-Nielsen J, et al. Impaired platelet aggregation and increased bleeding time during general anaesthesia with halothane. *Br J Anaesth* 53:1039, 1981.
2. Stengert K. Halothane-induced platelet dysfunction (abstract). *Anesth Analg* 61:217, 1982.
3. Walter F, Vulliemoz Y, Verosky M, Triner L. Effects of halothane on the cyclic 3', 5'-adenosine monophosphate enzyme system in human platelets. *Anesth Analg* 59:856, 1980.

Table: Bleeding time (secs.) following anesthetic agents.

Agent	Dose	Before Induct.	After Induct.	SEM $\Delta$	Change
N <sub>2</sub> O-fen.	.1-1 mg	585	699	113.65 $\pm$ 100	19.5
Halo.	.5-2%	513	726	213.2 $\pm$ 79*	4.2
Enflu.	1-3.5%	447	441	-6 $\pm$ 53	1.1
Isoflu.	1.2-3%	378	407	29 $\pm$ 61	7.7

\* significance  $p < .05$