Summary. Rate of absorption of Sr^{89} from ligated loops of rat intestine, and rate of passage of Sr^{89} through the intact intestinal tract were measured. Assuming only that absorption rate in ligated loops is reasonably the same as rate of absorption from that segment in the intact rat, the actual effective absorption was estimated. The highest initial rate of absorption occurred in the duodenum with jejunum, ileum, colon and stomach following in decreasing order. Since the radiostrontium passed rapidly through the duodenum and jejunum, the largest actual effective absorption occurred in the ileum (65%), with smaller contributions by the jejunum (17%), colon (8%), duodenum (7%), and stomach (2%). Two factors were found to limit Sr^{89} absorption: (1) Movement of the isotope into gut segments having slower absorption rate, and (2) decreased absorption of Sr^{89} in each gut loop with time.

The authors acknowledge the technical aid of Isabel Hewlett.

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Received September 14, 1959. P.S.E.B.M., 1959, v102.

Quantitative Measurement of Gastrointestinal Blood Loss During Ingestion of Aspirin. (25302)

KENNETH K. MATSUMOTO AND MORTON I. GROSSMAN
Wadsworth Vet. Hospital and Depts. of Medicine and Physiology, University of California Medical Center, Los Angeles

It has long been suspected that treatment with salicylates may induce gastrointestinal hemorrhage(1). Several recent studies(2-4) show that tests for occult blood in feces frequently become positive when salicylates are given. This report deals with the effect of ingestion of aspirin on gastrointestinal blood loss quantitatively assessed by measurement of fecal radioactivity in subjects whose erythrocytes were labeled with Cr^{51}.

Methods. Estimation of gastrointestinal blood loss with Cr^{51}. Twenty ml of venous blood was drawn and added to 10 ml of acid-citrate-dextrose solution containing 300 μ-curies of Cr^{51} as sodium chromate. The mixture remained at room temperature 30 minutes and then was injected intravenously. Starting 1 day later, oxalated blood samples were taken every 3 days. Serial 3-day composite stool collections in cardboard containers lined with bags of polyethylene film were begun 1 day after injection of tagged cells. Stool samples were weighed, a weighed amount of water was added, and homogenized in Waring blendor of 1 gallon capacity. Radioactivity of an aliquot of blood samples taken at beginning and end of each stool collection and of a weighed aliquot of homogenized stool was measured in a well-type scintillation detector with a gamma ray spectrometer set for Cr^{51} peak at 320 Mev. Gastrointestinal blood loss in ml/day was calculated as described by Ebaugh *et al.*(5). Subjects were adult male patients on gastroenterology wards of Wadsworth Veterans Hospital. Diagnoses, presence of upper gastrointestinal hemorrhage at time of entry to hospital, and incidence of history of gastrointestinal hemorrhage occurring while taking salicylate preparations are given in Table I. Patients who were bleeding when admitted to hospital were studied 2 or more weeks after evidences of hemorrhage had disappeared and, when study was begun, all were losing less than 2 ml of blood/day in the feces. *Administration of aspirin.* 28 subjects in Group 1 received 1 g of aspirin (3 tablets) 3 times a day

TABLE I. Diagnoses and Other Information on Subjects Studied.

Diagnosis	No. of subjects	No. bleeding on entry	No. with history of bleeding with salicylates
Group 1			
Duodenal ulcer	17	10	7
Gastric "	2		
Marginal "	1		1
Esophagitis	1	1	1
Cirrhosis	4	1	
Alcoholism	2		
Pancreatitis	1		
Group 2			
Duodenal ulcer	3	1	1
Pancreatitis	2		
Cirrhosis	5		

for 6 days. Stool and blood collections were made during, 3 days before, and 6 days after giving aspirin, a total of 5 3-day collections. Nine subjects in Group 1 received antacids (4 g $CaCO_3$ or 30 ml aluminum hydroxide gel) every waking hour during periods when aspirin was given. Group 2 of 10 subjects were studied for 7 three-day periods. During periods 2 and 5 they received 1 g aspirin 3 times a day, during 1 period as tablets, in other periods as a solution of 1 g aspirin powder plus 1 g $NaHCO_3$ dissolved in 100 ml water immediately before ingestion. Five subjects received tablets first and solution of aspirin second; the order was reversed in the other 5 subjects.

Results are summarized in Table II. Control levels of fecal blood loss ranged from 0.2 to 2.1 ml/day. In each subject fecal blood loss rose after aspirin was given, the peak rate occurring either during or in period immediately following administration of aspirin. For 38 subjects of Groups 1 and 2, the range of increases after aspirin (peak minus control) was from 0.2 to 13.5 ml/day, mean 3.3, stand. dev. 2.7. In 15 subjects the increase was less than 2 ml/day, in 16 between 2 and 5 ml/day, and in 7 it was 5 or more ml/day.

Analysis of variance showed that increase in fecal blood loss over the pre-drug level was statistically highly significant in both groups, for periods during and immediately following administration of aspirin (Group 1, $F = 13.95$, $P<0.005$; Group 2, $F = 4.86$, $P<0.01$). In Group 1 there were no significant differences between those who were bleeding when they entered hospital and those who were not, nor between those with history of bleeding associated with taking salicylates and those without such history. Patients who received antacids during periods when aspirin was given showed a smaller rise in fecal blood than those who did not receive antacids (period 3, $F = 7.07$, $P<0.01$; period 4, $F = 8.62$, $P<0.01$). In Group 2 fecal blood loss during period when aspirin was given in tablet form was not significantly different from that

TABLE II. Fecal Blood Loss before, during, and after Administration of Aspirin. (Means ± stand. dev. of fecal blood loss in ml/day.)

	No. of subjects	3-day period No. 1	2	3	4	5	6	7
		GROUP 1						
		Treatment						
Subgroup		0	A	A	0	0		
All	28	1.1 ±.4	2.9 ± 2.4	4.0 ± 2.9	3.5 ± 1.9	2.1 ± 1.1		
Antacid	9	1.0	2.2	2.8	2.2	2.1		
No antacid	19	1.2	3.3	4.6*	4.1*	2.1		
Bleeding on entry	12	1.2	2.4	3.7	3.5	2.1		
No bleeding on entry	16	1.1	3.3	4.2	3.5	2.1		
Salicylate history	9	1.1	2.9	3.0	2.8	1.9		
No salicylate history	19	1.1	2.9	4.5	3.8	2.2		
		GROUP 2						
		Treatment						
		0	SA	0	0	A	0	0
All	10	.9 ±.5	2.0 ± 1.5	1.4 ± 1.4	.9 ±.7	2.2 ± 1.6	2.2 ± 1.0	1.4 ±.4

Treatment: 0, no treatment; A, aspirin tablets, 1 g 3 times a day; SA, solution of aspirin, 1 g 3 times a day.

* Significantly different from comparison group.

during period when aspirin in solution was given ($F = 0.57$, $P > 0.10$).

Discussion. Previous investigators(2-4), using qualitative tests for occult blood in feces concluded that gastrointestinal bleeding induced by aspirin occurred: a) with both soluble and insoluble aspirin, b) in subjects with or without demonstrable gastrointestinal lesions, and c) in subjects with or without history of hemorrhage while ingesting aspirin. These findings are substantiated by the present study with quantitative measurements of fecal blood loss.

In no instance could bleeding under these experimental conditions be classified as clinically important gastrointestinal hemorrhage. The factors involved in patients who experience major hemorrhage while ingesting aspirin await elucidation.

Summary. In humans whose erythrocytes were tagged with Cr^{51}, fecal excretion of the isotope was used to measure gastrointestinal blood loss. In 38 subjects, ingestion of 3 g of aspirin/day for 3 or 6 days increased fecal blood loss of 3.3 ml/day. Patients who had recently had upper gastrointestinal bleeding and patients who gave a history of gastrointestinal hemorrhage while taking salicylates did not differ in their response from subjects without such histories. Blood loss was smaller in subjects who received antacids every waking hour while taking aspirin than in those who did not receive antacids. Alkaline solution of aspirin produced the same effect as aspirin tablets.

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Received September 14, 1959. P.S.E.B.M., 1959, v102.

Photosensitization of Tissue Culture Cells and Its Effect on Viral Plaque Formation.* (25303)

ROBERT H. GREEN AND EDWARD M. OPTON
Section of Epidemiology and Preventive Medicine, Yale University School of Medicine, New Haven, Conn.

The phenomenon of photosensitization or photodynamic action of dyes and other chemical compounds is well known, and has been observed to affect various microorganisms and cells, as well as plants, animals and man(1). Stilwell described the photodynamic action of neutral red on cultures of embryonic chick cells(2), but no report has been found of photosensitization of agar-overlaid tissue cultures by the neutral red which is commonly contained in the overlay medium. On the other hand, neutral red itself has been reported to be lethal for some cell cultures, and to reduce viral plaque counts in others(3). During the course of experiments involving the use of rhesus monkey kidney culture cells for the study of viral plaques, prepared as originally described by Dulbecco(4) and modified by Hsiung and Melnick(5), it was noted that occasionally entire cell sheets or portions of sheets in some bottles inexplicably deteriorated. This deterioration was evidenced by a change in color from the usual pinkish-red to orange or yellow, and a homogeneous appearance of the cell sheet and agar overlay, similar to that seen in the confluent degeneration caused by infection with certain viruses, and generally interpreted as being indicative of death of the cells. Cultures exposed to direct light during incubation in a lighted "walk-in" incubator usually were the ones affected.

Methods. The hypothesis that photosensitization caused such destruction was studied by exposing cultures to a standardized source of light. A commercial bacteriological incu-

* Aided by grant from National Fn.