to multiple sublethal doses of total body x-irradiation in the mouse. Not all substances with antioxidant activity, however, were active in this regard. Thus, whereas BHT and to a lesser extent DBH and propyl gallate prolonged survival under conditions of the present experiment, mixed tocopherols and Santoquin were inactive at the levels fed and DPPD exhibited only questionable activity. The protective effect of BHT, DBH and propyl gallate are consistent with the suggestion that the deleterious effects of ionizing radiation are due, at least in part, to peroxide formation(1, 2) and that antioxidants by preventing or minimizing peroxide formation exert a protective effect. The mixed tocopherols, which are naturally occurring antioxidants, were far less active, however, than the synthetic antioxidants BHT, DBH and propyl gallate, suggesting that the latter compounds might be more effective than tocopherols in reaching the site of peroxide action, or in their capacity to inhibit peroxide formation. If such were the case, it is possible that other antioxidants might be even more effective against radiation injury. The possibility has not been excluded, however, that the protective effect of BHT, DBH and propyl gallate is due to some mode of action other than their antioxidant activity.

Summary. Experiments were conducted to determine effects of antioxidants on survival time of mice exposed to multiple sublethal doses of total body x-irradiation. Mixed tocopherols and Santoquin at 0.25% level in the diet, and DPPD at levels of 0.25% or 0.5% of diet had little if any protective effect. Propyl gallate, DBH and BHT at levels of 0.25% or 0.5% of the diet increased survival over that on basal unsupplemented ration.

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Effect of Osmotic Diuresis on Renal Blood Flow.* (25805)

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The demonstration that osmotic diuresis has a protective effect against the tubular lesions following renal ischemia, first by Owen and associates(1), and later by Hatcher and his associates(2), arouses interest in what peculiar properties of osmotic diuresis might be responsible for this effect. Very little study has been devoted to effects of osmotic diuresis on renal function and hemodynamics. Earlier studies have been focused on the mechanisms by which osmotic diuresis was produced. This paper presents evidence that osmotic diuresis under certain conditions may affect renal blood flow.

Methods. Patients undergoing differential renal function studies in investigation of hypertension were used in this study. Only patients whose clearance studies revealed renal blood flow and glomerular filtration to be within normal limits were included. After ureteral catheterization and after obtaining a blood and urine blank specimen, priming and maintenance infusions of sodium paraaminohippurate and inulin were begun in accordance with previously described technics(3). Previously, patients had been hydrated by oral intake of at least 1000 cc of water before the experiment began. One hour was allowed for

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TABLE I. Changes in Total Urine Flow, Inulin Clearance, and PAH Clearance after Induction of Osmotic Diuresis. All values are in ml/min. 15 patients.

Before urea infusion			1st period after urea infusion			2nd period after urea infusion		
V	C_{IN}	C_{PAH}	V	C_{IN}	C_{PAH}	V	C_{IN}	C_{PAH}
3.4	121.8	506	6.0	128.9	473	5.4	97.8	452
2.5	107.4	361	4.4	109.5	434	10.7	86.0	460
1.9	50.3	175	6.3	63.2	221	8.2	48.0	180
2.2	80.3	293	5.3	66.4	353	4.8	74.2	364
2.3	60.8	285	7.2	62.7	307	8.8	72.1	256
1.0	105.5	552	3.3	97.2	630	8.5	179.2	751
1.6	94.6	644	3.4	144.6	751			
3.9	41.1	301	8.0	36.9	439	6.0	37.6	349
1.5	79.0	301	1.8	102	409	2.8	107.1	386
1.2	114.9	460	2.5	149.4	554	3.5	146.8	578
.8	83.5	433	2.8	94.0	598	7.5	100.3	552
2.1	101.7	447	3.6	104.9	546	3.8	100.0	492
1.1	114.3	453	2.2	145	553	5.8	117.6	534
.7	55.0	154	4.9	72.8	212	4.8	58.8	168
1.0	107.2	444	1.6	93.6	521	4.2	83.2	453

equilibration following injection of the priming dose; thereafter successive 30 minute clearances were done. By the time equilibration had occurred, the patients complained of mild to severe discomfort secondary to the presence of the catheters and the prolonged immobilization. Despite continued oral hydration, and a decrease in serum osmolality, antidiuresis ensued with pronounced drop in urine output and corresponding rise in urine concentration.

Results. Table I shows changes in clearances of 15 patients following infusion of 4 or 8% urea in saline. Before urea solution was infused, this group of patients without exception had ceased to exhibit water diuresis with a consequent drop in urine flow and increasing urine osmolality. Following infusion of urea, it can be seen that all but one of the patients had a distinct and definite rise in PAH clearance during the first 30 minute clearance period, ranging from 10% to 65% increase. In the second clearance period, the rise in PAH clearances was maintained in the majority of patients.

Changes in inulin clearance were not as striking nor as consistent as for PAH clearance. A large number of these patients actually showed little change or a slight drop in inulin clearance after infusion of urea was begun. Mean rise in inulin clearance following onset of osmotic diuresis was approximately 6.5% during the first clearance period.

In all patients a definite rise in urine output consistent with osmotic diuresis was seen following infusion of urea solution but there were no changes in pulse rate or blood pressure.

Discussion. No conclusions as to the mechanism by which osmotic diuresis may cause a rise in renal blood flow can be made from the present study. Prior to urea infusion all of the patients were in a well-established state of antidiuresis secondary to pain, a stimulus known to depress PAH clearance. It would appear likely that the increase seen in PAH clearance after onset of osmotic diuresis in this situation may be a return to normal flow rather than an actual increase.

Dogs stressed by anesthesia and an operative procedure showed a rise in directly measured renal blood flow after infusion of mannitol (Hostnik *et al.*)(4). The fall in renal flow usually seen after trauma appeared to be lessened.

Osmotic diuresis may benefit renal circulation after stress or trauma.

Summary. A rise in PAH clearance following onset of urea diuresis was observed in 14 patients out of 15 who exhibited antidiuresis secondary to pain following ureteral catheterization.

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