

Furosemide in either dose and ethacrynic acid produced a three-fold increase in urine volume. Epinephrine caused a lesser diuresis (two-fold). Inulin clearance was unaffected except by the epinephrine which resulted in a 1.3 fold increase ( $p = 0.04$ ). Osmolar clearance increased under the influence of all agents and proportionately greater than the augmentation of urine volume. With furosemide and ethacrynic acid, the ratio of urine osmolality to that of plasma regularly exceeded 0.9 and in many instances approached unity. This increased osmolar output under the influence of diuretics was contributed to heavily by urea and sodium ion. Urea excretion increased 8 to 9 fold on the average with furosemide or ethacrynic acid in contrast to a 4-fold increase with epinephrine. Urea excretion relative to its filtered load changed from 6% to over 40% with furosemide and ethacrynic acid, and from 6% to 17% with epinephrine. Plasma urea concentration decreased only slightly in all experimental groups.

A moderate but regular (about two-fold) increase in calcium excretion was observed with both the diuretic drugs and epinephrine. Magnesium excretion was unchanged. In some studies potassium output was increased but this was irregular and requires further study.

The diuretic drugs, furosemide and ethacrynic acid, have dramatic effects on urea and sodium excretion in *Squalus acanthias*. There is no alteration in rate of glomerular filtration, and interference with active tubular reabsorption of urea and sodium is proposed. Epinephrine also produced increased excretion of urea and sodium but this is moderate and associated with a mild increase in glomerular filtration.

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## CARDIOVASCULAR RESPONSES TO SPINAL CORD STIMULATION IN THE DOGFISH

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The spinal cord was stimulated in 22 anesthetized dogfish (20 mgm/Kgm pentobarbital intrarterially) in which the cord had been transected at the spino-medullary junction. In five fish the brain was also removed. Blood pressure was recorded from a catheter inserted into the dorsal aorta. Rectangular stimuli were delivered for not less than 30 seconds at a variety of voltages (5-25) and frequencies (5-50 Hz). Stimulation at distances 1-8 cm caudal to the transection site caused complete cardiac inhibition or marked slowing either with or without an intact brain (Figure 1). Blood pressure elevated abruptly with the onset of stimulation even though the heart stopped completely. It then declined exponentially until the heart resumed beating. The blood pressure then increased, sometimes to greater than control level, but decreased to control value before the cessation of stimulation. During the second rise of pressure (after the resumption of the heart beat) the pulse pressure was increased. Cardiac inhibition was rarely observed when the cord was stimulated more than 12 cm caudal to the transection site. Blood pressure sometimes increased and then decreased abruptly simultaneously with the onset and cessation of stimulation (Figure 2A and B).

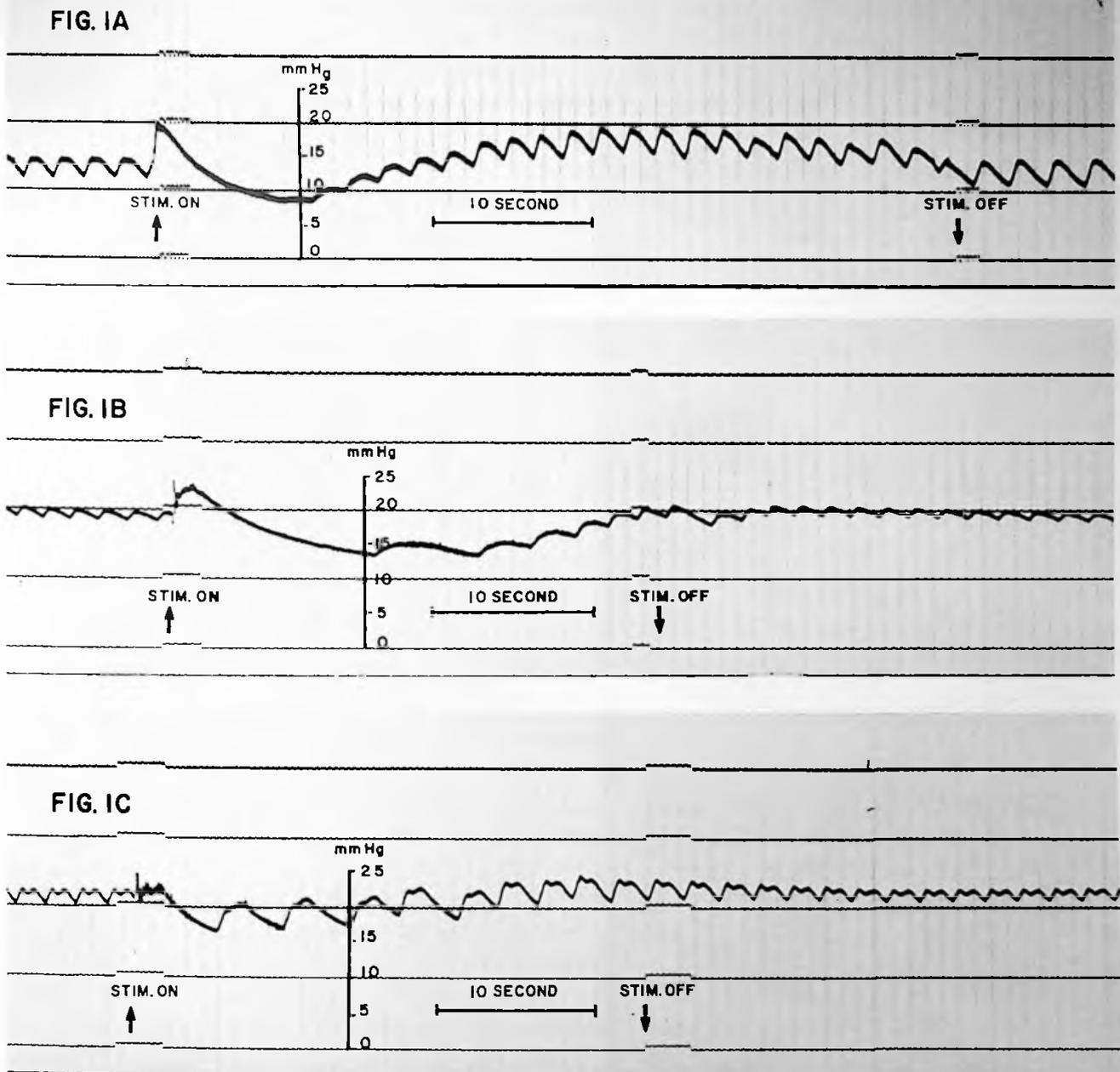


Figure 1 - Dorsal aortic blood pressure response to spinal cord stimulation in dogfish (*Squalus acanthias*). A-The spinal cord was transected at the spino-medullary junction (foramen magnum) and the brain removed. The cord was stimulated 2 cm caudal to the transection site for 50 sec. with rectangular impulses of 10 msec duration, 20 Hz and 25 volts intensity. B-Spinal cord transected at the spino-medullary junction but brain intact. Stimulation (20 Hz, 25 volts) applied 2 cm caudal to transection site. C-Spinal cord transected at spino-medullary junction but brain intact. Stimulation applied 8 cm caudal to transection site. Stimulation characteristics as in A and B above.

FIG. 2A

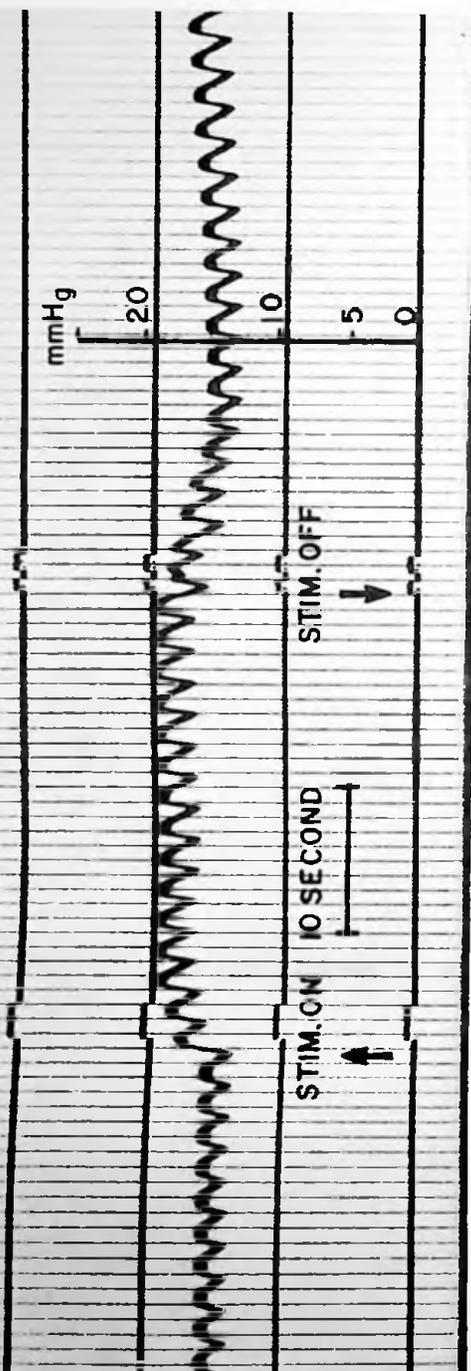


FIG. 2B

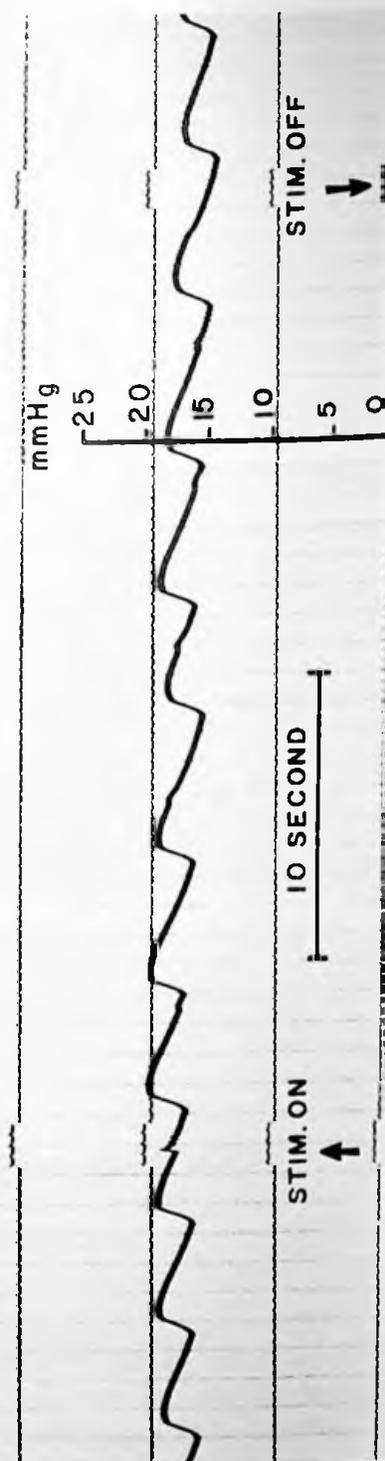


Figure 2 - Dorsal aortic blood pressure response in spinally transected dogfish. A-Stimulation of spinal cord 8 cm caudal to transection site. Brain destroyed. Stimulation characteristics as in Figure 1. This is the same fish as in Figure 1A. B-Stimulation 12 cm caudal to transection site (foramen magnum). Brain intact. Stimulation characteristics as in Figure 1.

These results do not provide evidence for any reflex vasomotor changes induced by spinal cord stimulation. The results are fully explainable by the effect of the cardiac inhibition and the contraction of the trunk skeletal muscle mass which exerted torsion and compression effects on the blood vessels. The cardiac inhibition cannot be explained by a vagal reflex since it occurred in the absence of the brain and observations on the stimulus strength to response indicate that the inhibition is not due to the spread of stimulus through electrolyte conducting medium.

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#### PURINE METABOLISM IN PRIMITIVE ERYTHROCYTES

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Over the past eight years this laboratory has examined various aspects of the purine metabolism of human erythrocytes. Several enzymes of purine nucleotide metabolism have been described in some detail and new methods have been developed employing high-pressure liquid chromatography for the examination of patterns of nucleotides in small amounts of tissues (*J. of Chromatography*, 52, 257, 1970). Recently we have undertaken a comparative study of the erythrocytes of various terrestrial vertebrates. The present report extends these studies to a preliminary examination of some aspects of purine metabolism of the nucleated erythrocytes of several of the marine species. Since the cyclostomes and elasmobranchs are among the most primitive vertebrates, particular attention was paid to erythrocytes from the hagfish (*Myxine glutinosa*) and the dogfish (*Squalus acanthias*).

Figure 1 shows the nucleotide patterns obtained by high-pressure liquid chromatography of neutralized trichloroacetic acid extracts of erythrocytes from man (*Homo sapiens*), saltwater eel (*Anguilla rostrata*), sand dab (*Lophopsetta maculata*), skate (*Raja erinacea*), and the hagfish (*Myxine glutinosa*). In comparison with other tissues examined by this laboratory the nucleotide pattern for