

sweat glands under cortical influence by recording the galvanic skin response. The reaction observed after both types of lesions of the brain stem was as a rule weaker than with the brain stem intact, particularly after severance of the hypothalamic tracts.

On the *bladder*, cortical stimulation produced stimulating as well as inhibitory effects. It is interesting to note that not only the stimulating, but also the inhibitory reactions depend mainly upon the pelvic nerves. The increase of bladder activity as well as the inhibition of this organ were observed in both series of experiments. The severance of the extra-pyramidal tracts did not impair these reactions to a greater extent than did the section of the pyramidal tracts.

It is concluded that there exists a double (pyramidal and extra-pyramidal) conduction of cortico-fugal impulses to the autonomic centers in the cord.

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Mechanism of Invasiveness in the Genus *Streptococcus*.

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Menkin¹ recently demonstrated that various materials are fixed *in situ* when injected into an acutely inflamed area, and that the mechanism of fixation of such substances as bacteria and trypan blue is primarily mechanical obstruction in the form of a fibrinous net-work and thrombosed lymphatics at the site of inflammation. Obviously the speed with which an inflammatory irritant causes the region to be blocked off is a significant factor in determining its ability to disseminate into the contiguous tissues or blood stream. Menkin¹ observed that *Staphylococcus aureus* caused the formation of thrombi in the lymphatics and fixation of trypan blue within about one hour after their introduction into the skin of rabbits, while the more invasive *Streptococcus hemolyticus* produced fixation only about 45 hours later. Menkin believed that the delayed fixation in the latter case was due to the "relatively mild local effects" of the streptococcus.

¹ Menkin, V., *J. Exp. Med.*, 1933, **57**, 977.

Using Menkin's¹ method, we have fully confirmed his observations of the behavior of *Strep. hemolyticus* and *Staph. aureus* *in vivo*, but our additional data show that the delayed inflammatory fixation of streptococci is due to the production by these organisms of a substance or substances, active both *in vivo* and *in vitro*, which when present in sufficient concentration is capable of inhibiting inflammatory fixation for many hours, thus enabling the organisms to disseminate relatively freely through the lymphatics.

Our *in vivo* observations have been carried out on more than 150 rabbits. The organisms studied were the Dochez and Griffith scarlatinal strains and Birkhaug's E₁ erysipelas strain of *Strep. hemolyticus*, a virulent strain of *Strep. viridans*, and 2 strains of *Staph. aureus*. The "fixation time" for each strain was: Dochez 48-56 hr.; Griffith 48 hr.; E₁ 48 hr.; *Strep. viridans* 36 hr.; *Staph. aureus* 1-2 hr. The staphylococcus strains used always produced fixation of the dye in less than 2 hours.

The inhibitive properties of streptococcus cultures and filtrates were demonstrated by injecting 0.5 cc. amounts into the skin of the fore legs of a series of rabbits, and 20 minutes later introducing a suspension of 5 billion *Staph. aureus* (0.5 cc.) into the same area. Injection of 0.4 cc. of trypan blue into the inflamed areas at appropriate intervals and subsequent examination of the axillary lymph nodes for the presence of the dye, showed that the filtrates and cultures introduced were capable of delaying the fixation of the dye for at least 4 hours, despite the antagonistic action of the staphylococcus. All of the invasive strains of *Streptococcus* studied have shown inhibitive properties, and there is some evidence that the more invasive strains of *Staph. aureus* may delay fixation.

Rabbits immunized against *Strep. hemolyticus* showed a reduction of the fixation time from 48 hr. to 6 hr.

Our *in vitro* studies indicate that the mechanism by means of which inflammatory fixation is inhibited may be different for different kinds of streptococci. The action of the different strains on human and rabbit plasma clot has been tested according to the method of Tillett and Garner,² with the following results:

Strain	Human plasma clot	Rabbit plasma clot
Dochez	Rapid lysis	Rapid clot retraction
Griffith	Rapid lysis	Rapid clot retraction
E ₁	Inhibition of clot formation	Inhibition of clot formation
<i>Strep. viridans</i>	Inhibition of clot formation	Inhibition of clot formation

² Tillett, W. S., and Garner, R. L., *J. Exp. Med.*, 1933, **58**, 485.

The lytic property of the Dochez and Griffith filtrates is relatively resistant to heat, one hour at 100°C. in the water bath being required to destroy it, although it is noticeably weakened after 40 minutes. The factor which inhibits clot formation is even more thermostable, since boiling for 1 hour seldom shows any weakening effects.

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Experimental Angina Pectoris in the Dog. Effect of Total Thyroidectomy.

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The clinical observation that the beneficial effect of total thyroidectomy in angina pectoris is an almost immediate one, and so cannot be due entirely to the fall in the basal metabolic rate which does not begin to occur for over a week, has given rise to speculation as to the possible mechanism involved.

We investigated the possibility that this effect might be due to interruption of nerve impulses from the heart. Our method was that described by Sutton and Lueth¹ for producing "experimental angina pectoris" in the dog consisting in placing a ligature about the anterior descending branch of the left coronary artery and compressing the coronary vessels by traction on this ligature. This method was successfully employed by White and his associates² to test the efficacy of various surgical procedures in interrupting the afferent nervous pathways of the heart. Five dogs were tested in this manner after removal of both thyroids. One animal was tested 5 hours after thyroidectomy, and 4 dogs on the eleventh, thirteenth, fourteenth, and twenty-eighth day respectively. A definite discomfort response was elicited in each instance. Two of the dogs had been similarly tested previous to the thyroidectomy and in these no diminution was noted in the amount of traction required to produce the typical response.

The relief of angina by removal of the thyroid may be due to the diminished sensitiveness to adrenalin³ which has been demon-

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¹ Sutton, D. C., and Lueth, H. C., *Arch. Int. Med.*, 1930, **45**, 827.

² White, J. C., Garrey, W. E., and Atkins, J. A., *Arch. Surg.*, 1933, **26**, 765.

³ Eppinger, E. C., and Levine, S. A., *Proc. Soc. Exp. Biol. and Med.*, 1934, **31**, 485.