

but not allowed to be mixed with the immune serum. A small loopful of a 1:100 dilution of an 18-hour pneumococcus culture is then inoculated into the plate by washing it in the dextrose solution. 10 cc. molten beef infusion agar pH 7.8 cooled to 40-42°C. is then poured and the contents of the plate mixed thoroughly. The plate is then incubated for 20 hours at body temperature, and then examined. Colonies surrounded by annular opacity as described above indicate the same type of pneumococcus as that of the immune serum used.

Working with such a method, mixed cultures of Type I and Type II pneumococci have been rapidly identified and again grown in pure cultures. These cultures have been found to retain their original characteristics.

Summary. A medium consisting of 1% dextrose beef infusion agar pH 7.8 and type specific antipneumococcus serum is presented. Pneumococci of the homologous type when grown in the depths of the immune serum-agar plate develop well defined annular opacity surrounding each colony. The development of the annular opacities has been found to be strictly type specific.

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Action of Ephedrine on Peripheral Blood Vessels as Observed in "Transparent Chamber Preparations".*

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Six rabbits with transparent chambers introduced into the ears according to the Sandison¹ technique were studied. The blood vessels studied included both preformed, and newly formed ones of from 10 days to 4 months old. The reaction to ephedrine of these various types of vessels was essentially the same.

Ephedrine hydrochloride in 0.1% to 1.0% solutions in 0.9% saline was introduced by intravenous injection into the marginal vein of the unobserved ear or the saphenous vein of the leg and continuous observation with the microscope under low power was made during the first half hour after the injection.

* This study was started at the Marine Biological Laboratory at Woods Hole, Mass., and a preliminary note was communicated to Dr. K. K. Chen² in 1928, to whom the writer is indebted for one of the samples of ephedrine hydrochloride used.

¹ Sandison, J. C., *Am. J. Anat.*, 1928, **41**, 447.

Ephedrine in doses from 0.1 to 0.8 mg. (0.1% solution) injected into the blood stream did not produce a change in the vessels of the ear chamber. A slight narrowing of the central artery and a slowing of the circulation in the vascular bed was observed when the amount injected was 1 mg. (1% solution). The flow in a few capillaries became reversed, while in a few others it was accelerated, although the calibre of these showed no changes. The effect took place in a half to one minute after the injection and disappeared in about 5 minutes.

With a dose of 2 mg. (1% solution) the constriction of the central artery was more marked. The wave of constriction started from the central portion and travelled toward the periphery. This appears to differ from the effect exerted by epinephrin, which usually produced a wave starting from the opposite direction, namely from the periphery to the center. The arterioles, venules and capillaries again showed no changes in the size of the lumen. A slowing or reversal of the flow in a number of these minute vessels was apparently secondary to the changes in the arteries.

Following the primary constriction of the central artery there was a series of relaxation periods alternating with constriction periods. These effects lasted about one-half hour. At first the relaxation phase was very short but gradually it was prolonged until the normal condition was reestablished, when there was observed 2 to 3 short constrictions in the central artery in the course of an hour.

With larger doses of ephedrine, 4 to 5 mg. (1% solution), the effect was more intense. The lumen of the central artery became obliterated immediately after the injection and this constriction persisted for 3 to 4 minutes. The subsequent relaxation and constriction continued in rapid succession for an hour before a normal circulation was resumed. A number of the smaller arteries also showed rings of constriction at points of bifurcation during the first 20 minutes.

No active constriction or dilatation was noted in the arterioles, capillaries, or venules. This fact again differs from that observed with epinephrin which in moderate doses produced a marked constriction of the arterioles.

These findings confirm those described by Chen² for the circulation of the frog's tongue, web, mesentery and kidney in showing that ephedrine does not directly affect the extremely peripheral circulation.

² Chen, K. K., and Schmidt, C. F., *Medicine*, 1930, **9**, 1.