

Conclusion: The method fails to cure well-marked cases of Kalaazar and may render them very intractable to further treatment.

The results of this work indicate that intravenous injection is the only practicable route for the administration of tartar emetic in the treatment of human cases of Kalaazar.

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The effect of ephedrine on experimental shock and hemorrhage.

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In our previous report,^{1,2} it was shown that ephedrine, an alkaloid isolated from Ma Huang, possesses sympathomimetic actions. Its outstanding feature is its circulatory stimulation by acting on both the cardiac accelerator ganglia and endings. The rise in blood pressure and pulse rate lasts for more than 15 minutes, and sometimes indefinitely.

The purpose of the present paper is to report the influence of ephedrine in hemorrhage and in shock induced by different methods. All the results were obtained from dogs. Histamine in the dosage of 2-3 mg. per kg., or Witte's peptone in dosage of 50 mg. per kg., caused a fall in blood pressure as low as 30-40 mm. hg., but a subsequent intravenous injection of ephedrine always brought it back to the initial level, and maintained it there for more than 3 hours, when the animal was killed. In surgical and traumatic shock, produced by pinching of the liver, exposure and manipulation of intestines, insertion of ice bags into the abdominal cavity, and opening of windows in the operating room, the external temperature being 25° C., the blood pressure in one experiment fell from 150 to 53 mm. hg. within eight minutes, but

¹ Chen, K. K., and Schmidt, Carl F., *Proc. Soc. Exp. Biol. and Med.*, 1924, **xxi**, 351.

² Chen, K. K., and Schmidt, Carl F., *J. Pharm. and Exp. Ther.*, 1924.

was immediately raised to 130 by an intravenous injection of ephedrine. Although there was some fall at the end of 3 hours, it was still well above the critical level. In anaphylactic shock, produced according to the method of Simonds,³ the blood pressure was similarly raised by ephedrine. Finally, the low blood pressure in those animals which had been suddenly bled 25 percent of their total volume, was quickly elevated by the injection of ephedrine. The beneficial effect in these cases, however, did not last much longer than one hour, on account of much loss of volume. In every case, of either hemorrhage or shock, the pulse rate was permanently increased after ephedrine.

In a total of 22 experiments to date, it was found that, as a rule, 2-3 mg. of ephedrine per kg. of body weight in dogs, seem to be an efficient dose, and that repeated injections give no additional effect although without harmful symptoms. In a few instances, when the heart beat became nearly imperceptible on the pressure tracing, or when the blood pressure stayed too long at a very low level, ephedrine could not raise the blood pressure to any high extent, while the injections of defibrinated blood could still restore it to the normal level.

Although the question of shock is not yet settled, some hint towards the explanation of its cause has been made in connection with the investigation of wound shock by the British Medical Research Committee⁴ during the last World War. The relation of different types of shock is better understood. Dale⁵ explains the fall of blood pressure, in histamine shock, as due partly to the stagnation of blood in the dilated capillaries, and partly to the loss of plasma through the abnormally permeable endothelium. The effective currency is greatly reduced, and the heart is practically working with nothing. Under certain conditions, surgical and traumatic shock is apparently due to nothing but to the absorption of histamine or histamine-like substance from the injured tissues after autolysis, as illustrated by Bayliss and Cannon.^{6, 7} In Witte's peptone, Abel⁸ has shown that the

³ Simonds, J. P., *J. Infect. Dis.*, 1916, xix, 746.

⁴ *Br. Med. Res. Com., Sp. Ser.*, 1919, Nos. 25-27.

⁵ Dale, H. H., *Harvey Lectures*, 1919, 20, 26.

⁶ Bayliss, W. M., *Br. Med. Res. Com., Sp. Ser.*, No. 26, 23.

⁷ Cannon, W. B., *Ibid.*, No. 26, 27.

⁸ Abel, J. J., and Geiling, E. M. K., *J. Pharm. and Exp. Ther.*, 1924, xxiii,

most toxic element is histamine; and Underhill and Ringer⁹ have already shown the close resemblance between peptone and histamine shock. Suggestion has also been made by Dale¹⁰ that anaphylactic shock follows the same mechanism after the interaction of antibody with the corresponding antigen. Should the question of shock be limited to histamine, and should Dale's idea of histamine shock stand, the explanation of the effect of ephedrine in the cases studied here would be simple.

Of the four main measures of raising blood pressure, the injection of pressor drugs such as pituitrin and adrenalin during shock is useless because the arteries are already constricted to a high degree. The increase in the viscosity of the blood is not practical because it is also increased during shock. One good and sure way of raising the blood pressure is by increasing the blood volume with an homologous blood, and there is no doubt that blood transfusion is one of the best methods, if not the best. Another possible way of raising the blood pressure is by the increase of cardiac contraction; and this appears to be what ephedrine does in shock. In one of our three experiments in which the kidney volume was taken, an injection of ephedrine after histamine caused initial brief constriction, rapidly followed by a continuous dilatation of kidney volume. The blood pressure rose from 24 to 132 mm. hg., and pulse rate to 228 per minute, which persisted for more than 3 hours. Thirty minutes following the injection the kidney was still rapidly dilating. The rise and maintainance of blood pressure can therefore be attributed to cardiac stimulation, and not to arterial constriction. It seems to be fairly clear that the increase in heart contraction and pulse rate *dislodges* the stagnated blood in the capillaries and brings more blood to the effective currency, which a normal heart cannot do during shock. The value of such a mode of action of ephedrine is very essential: (a) It breaks the vicious cycle of shock, (b) it brings more nutrition to the heart itself, the medulla and other essential organs, and (c) it probably hastens the destruction of histamine, for it has been shown that histamine is rapidly destroyed in the presence of efficient circulation.⁶

In case of hemorrhage, ephedrine will be a great help so long as there is hope of restoration of blood volume. If it is not

⁹ Underhill, F. P. and Ringer, M., *J. Pharm. and Exp. Ther.*, 1922, **xix**, 163.

¹⁰ Dale, H. H., and Laidlow, P. P., *J. Physiol.*, 1918-19, **lii**, 388.

extensive, ephedrine alone will probably be enough while the blood volume gradually recovers at the expense of tissue fluids. Should it be extensive, it can be used as an emergency drug while transfusion or other important measures are in preparation.

Based on experimental results, it is advocated that ephedrine should be employed in surgical shock and hemorrhage, or as a prophylactic remedy in long operations.

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The experimental transfer of certain intestinal protozoa from man to monkeys.

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The species identity of intestinal amœbae harbored by monkeys with the intestinal amœbae of man presents a difference of opinion among protozoologists, one group believing them to be identical with the common species found in man, and another group believing them to present distinct species differences. It seems that this question can best be settled by investigation from three main angles, first, by a study of the morphological characteristics, second, by experimental transfer of the protozoa from one species of host to another closely related host, and third, by a comparative study of the various forms under artificial culture conditions.

This paper is a preliminary report of the experimental transfer of certain of the intestinal protozoa from man to monkeys. The routine examination of the faeces of seven monkeys from Southern China, belonging to the genus, *Pithecus*, showed the presence of protozoa indistinguishable morphologically from *E. dysenteriae*, *Endolimax nana*, *Endamoeba coli*, *Councilmania lafleuri*, *Iodamoeba bütschlii*, and *Chilomastix mesnili*. To the knowledge of the writer this is the first report of the presence of *Councilmania* and of *Chilomastix* in monkeys.