large amount of buffer substance as compared with human milk, on the above hypothesis we can explain why infants fed on cow's milk are more prone to rickets than those who are breast fed. Individual differences in HCl secretion may also explain why one of a pair of breast fed twins may be rachitic and the other not. Furthermore, the fact that inanition greatly retards the rachitic process can also be explained on this hypothesis since the products of katabolism of body tissue are acid in reaction and may help to restore the normal acid-base balance.

While we do not consider our experiments sufficiently numerous, and the many factors involved in so complex a salt mixture as we have used well enough controlled to permit us to draw final conclusions, they have suggested lines for further study. Experiments cited above, supplemented by others now under way, will be published in detail at a later date.

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Anaphylactic reactions in isolated rabbit lungs.

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It was shown by Coca[1] that the dominant physological reaction in acute anapylaxis in rabbits is an occlusion of the pulmonary blood vessels with red blood corpuscle masses. Coca has evidence that this conclusion is not due to thrombosis or hemagglutination (embolism). He therefore concludes that it is due to an acute pulmonary vasoconstriction, comparable with the acute bronchoconstriction in anaphylactic guinea pigs. We have endeavored to test this conclusion by our routine perfusion technique.

On perfusing the isolated lungs of horse serum sensitized guinea-pigs with 2 per cent horse serum in Locke's solution, a distinct bronchoconstriction is demonstrable within thirty seconds, increasing to a complete bronchial stenosis by the end of two minutes.[2] At this stage of the reaction, the lungs can neither

1 Coca, A. F., The Mechanism of the Anaphylaxis Reactions in the Rabbit. *J. Immunol.*, 1919, iv, 219.

2 Manwaring, W. H., and Kusama, Y., Analysis of the Anaphylactic and Immune Reactions by Means of the Isolated Guinea-pig Lungs. *J. Immunol.*, 1917, ii, 157.

be expanded nor collapsed by changes in air pressure in the tracheal canula.

If the isolated lungs of rabbits sensitized to horse serum by Auer's method are similarly perfused, no bronchoconstriction is demonstrable. A slight increase in perfusion resistance takes place, the rate of perfusion flow being reduced about 8 per cent. This increase, however, is so slight that it cannot be assumed to play a clinically recognizable rôle.

That a marked vasoconstriction, comparable with the acute bronchoconstriction in anaphylactic guinea-pigs, is physiologically possible in isolated rabbit lungs, is shown by the 95 per cent reduction in perfusion flow with histamine and the 75 per cent reduction with Vaughan's protein split product.[3]

Perfusion tests have not yet been made with rabbits sensitized by Coca's method. If equally negative results are obtained with these more highly sensitized rabbits, one must conclude, either: (1) that a preliminary reaction in the circulating blood (anaphylotoxin formation) is necessary for the pulmonary vasoconstriction described by Coca, or (2) that the site of the vascular occlusion is in some part of the pulmonary circulation other than the branches of the pulmonary artery.

We believe that the pulmonary capillaries will ultimately be shown to be the essential site of this occlusion. If this proves to be the case, the occlusion of the pulmonary blood vessels with red blood corpuscle masses will not be due to smooth-muscle reactions (vasoconstriction), as currently assumed, but to increased capillary blood viscosity secondary to a suddenly increased capillary permeability. This view is in accord with recent studies in capillary permeability in canine anaphylaxis.[4, 5, 6, 7]

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[3] Manwaring, W. H., and Marino, H. D., Serological Reactions in Isolated Rabbit Lungs, I. Reactions to Histamine and to Vaughn's Split Product. *J. Immunol.*, 1923, viii, 317.

[4] Manwaring, W. H., Chilcote, R. C., and Hosepian, V. M. Capillary Permeability in Anaphylaxis. *J. Am. Med. Assn.*, 1923, lxxx, 303.

[5] Petersen, W. F., and Levison, S. A., Studies in Endothelial Permeability. II. The role of the endothelium in canine anaphylactic shock. *J. Immunol.*, 1923, viii, 349.

[6] Petersen, W. F. Jaffe, R. H., Levison, S. A., and Hughes, T. P., Studies in Endothelial Permeability. IV. The modification of canine anaphylactic shock by means of endothelial blockade. *J. Immunol.*, 1923, viii, 367.

[7] Manwaring, W. H., Hosepian, V. M., and Thomson, W. L., Quantitative Study of Anaphylactic Capillary Permeability. *J. Am. Med. Assn.*, (In press.)