distribution of the additional receptors which are postulated by the polychromatic theory.

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Factors Influencing the Renal Threshold

IT appears that threshold substances fall into two groups as regards their mode of tubular resorption. Glucose, xylose, phosphate, sulphate, amino acids and ascorbic acid on one hand have a definite Tm[1,2] value (maximal tubular resorption, mgm./min.) which is a measure of the active tubular cell-mass; the resorption of chloride and bicarbonate ions[3,4], on the other hand, is proportional to the quantity of glomerular filtrate.

The purpose of this note is to discuss the factors on which the threshold values of various substances depend, and to examine whether or not the difference in the resorption mechanism referred to above is reflected in the behaviour of the threshold.

For either group the value of the threshold Tx, mgm. per cent, of a substance x is such that

$$F_0 Tx/100 = Rx_0, \quad (1)$$

where Rx is the amount resorbed in the tubules (mgm./min.), F the rate of glomerular filtration (c.c./min.) and zero subscripts refer to values corresponding to the plasma concentration Tx. Evidently, for substances of the second group, where

$$100.Rx/F = \text{const.}, \quad (2)$$

$$Tx = 100.Rx/F \quad (3)$$

for any pair of values Rx and F[3,5]. This threshold is independent of the concentration of x in the plasma (Px) and of the actual values of Rx and F. It is a characteristic of the tubular function.

For substances of the first group

$$Rx = Tmx = \text{const.}, \quad (4)$$

for $Px \geqslant Tx$, and the formula of Földi *et al.*[6] can be used for the calculation of the threshold:

$$Tx = Px - \frac{P}{U}(Ux), \quad (5)$$

where P/U is the inulin concentration ratio and Ux the concentration of x in urine (mgm. per cent).

From (1), and putting $Rx_0 = Tmx$, we obtain

$$Tx = 100.Tmx/F_0. \quad (6)$$

It will be seen that, in this case, Tx is not a constant, but a function of Tmx and F_0. We have pointed out elsewhere[7] that Földi's formula can only be used if F is constant and independent of Px. It actually is so (as seen, for example, from Shannon and Fisher's data[1] for glucose), so that it is possible to write F instead of F_0 in (6). Thus, for substances having a threshold Tm,

$$Tx = 100.Tmx/F. \quad (7)$$

For every pair of values (Tmx, F), therefore, there is a threshold value $Tx_{(Tmx,\,F)}$.

Földi[8], in a recent communication, has expressed the threshold as

$$Tx = Px.Rx/Fx, \quad (8)$$

where Fx is the rate of glomerular filtration of x mgm./min., Rx is the rate of tubular re-absorption of x mgm./min., both being the values corresponding to the plasma level Px; and he has come to the conclusion that Tx is a function of the variables appearing on the right-hand side of (8). It would seem from the above discussion, however, that Tx is either itself a characteristic constant of the kidney, or a function of Tmx and F, as the case may be; but it is certainly independent of Px, the actual plasma concentration of x. Tx can, it is true, be calculated from Földi's formula, which involves Px, but the threshold is not a function of Px. We would clarify our point by a physical example: Boyle's law gives the equation of state for one mole of an ideal gas at constant temperature as

$$pV = \text{const.}, \quad (9)$$

where p is pressure and V is volume, and the constant is proportional to the absolute temperature. It is possible to calculate the constant from (9), but it cannot be said to be a function of the variables appearing in that equation. (8) is a precisely analogous equation between the variables Px, Rx and Fx, and the value of Tx is independent of the actual values of the variables, because it is constant for given values of Tmx and F.

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Nodes in the Central Nervous System

IT is commonly stated that the nodes originally described by Ranvier[1], which are so characteristic a feature of peripheral nerve fibres, do not occur within the central nervous system. However, Ramón y Cajal, in his descriptions of those penetrating researches which have distinguished him as one of the foremost histologists of all time, refers repeatedly to *étranglements* or nodes on nerve fibres within the brain and spinal cord, and these are beautifully illustrated in some of his publications[2,3]. In spite of these observations, the absence of nodes in the central nervous system has often been assumed by some contemporary neurohistologists[4,5] and in many standard text-books of histology and neurology.

Recently, while examining several brains taken from rabbits injected intravenously with methylene blue, we have been able to confirm Ramon y Cajal's observations[6]. Deeply stained nodes, often associated with slight constrictions of the axis cylinder, have been found to be situated at intervals along tracts in many parts of the brain. Their morphological details are similar to those of nodes in peripheral fibres, including in some cases well-defined bracelets and cementing disks (see photograph). They are particularly conspicuous in fibres undergoing early degeneration, in which the axoplasm is metachromatically stained purple while the nodes remain a deep blue-