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SYMBOLS OF OCULAR DYNAMICS*

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In the past few years the treatment of intra-ocular dynamics in mathematical terms has become increasingly popular. Unfortunately, though there is little disagreement as to the form the equations should take, the tendency has been for a different set of symbols to be brought into use in each laboratory. This was not too serious when the exchange of substances between the blood and aqueous humour alone was being considered. Now, however, the exchanges between all the tissues and fluids of the eye are being formulated in terms of a dozen or more constants, and much unnecessary confusion would be avoided if a uniform and logical system of symbols were employed.

Accordingly, we developed a system which we circulated to those workers we knew to be active in the field. Apart from some criticism of detail it found a ready acceptance. The scheme has been modified to take account of these criticisms, and it now has the following form which we hope will be generally useful. On casual reading it may appear complicated, but we think its adoption would simplify a still more complicated state of affairs.

Each tissue or fluid is represented by a letter in subscript as follows:

a Anterior aqueous humour
h Posterior aqueous humour (hind-humour, *Hinterkammer*)
v Vitreous humour
c Cornea
l Lens
i Iris
z Ciliary body (*Ziliarkorper*)
p Plasma
d Tears (*Dacryon*)

Their volumes and masses are represented by V and M. Thus: V_a, M_i (volume of anterior aqueous humour, mass of iris.)

The interfacial areas between them are represented by A. Thus: A_{ac} (area of posterior corneal surface).

The mass of a substance in a tissue or fluid is represented by m. Thus: m_c (mass of substance in cornea) and m_{ac}, m_{ca} (net mass moved from aqueous humour to cornea, and *vice versa*).

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The concentration of a substance in a tissue is expressed as mass of substance per unit mass tissue by C, and as mass substance per volume tissue water by c. Thus: C_z, c_z (mass per gram ciliary body, mass per ml. ciliary body water).

Permeability constants of membranes are expressed by K. Thus: K_{cd} (permeability constant of corneal epithelium in direction stroma to tears).

These permeability constants are defined by the equation:

$$\frac{dm_{cd}}{dt} = (K_{cd}\,C_c - K_{dc}\,C_d)\,A_{cd}$$

where t is the time.

Transfer coefficients between tissues or fluids are represented by k. Thus: k_{hv} (transfer coefficient from posterior chamber to vitreous).

The transfer equation between the vitreous and the posterior chamber would therefore become:

$$\frac{dC_h}{dt} = k_{vh}\,C_v - k_{hv}\,C_h$$

Since the value of the coefficient depends on the volume of the tissue or fluid in which the changes in concentration are being considered, this can be shown by a further subscript. Thus: in the equation above, k_{vh} would become $k_{h \cdot vh}$; then $k_{v \cdot vh} = \frac{V_h}{V_v}\,k_{h \cdot vh}$

When the transfer coefficient from a tissue or fluid into several others is to be identified, addition signs may be used. For example, the transfer coefficient from the posterior chamber into the vitreous and lens may be written $k_{h \cdot h\,(v+l)}$.

The total transfer coefficient out of a tissue or fluid may be written simply. Thus: k_h.

In the case of the aqueous humour, k_o, k_d, and k_f may be retained for the total transfer coefficient out, and its diffusional and flow components.

The steady-state concentration ratio between two tissues or fluid is shown by R. Thus: R_{ap} (ratio of concentration in aqueous humour to that in plasma).

This system can be extended to other branches of ophthalmological research where it is necessary to give symbols to the properties of the tissue or to the relationships between them.