The biology of epithelial cell populations

Volume 1

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Abbreviations

CCPR  The crypt cell production rate, measured in cells produced per crypt per hour.
FCM   Flow cytometry.
FLM   The fraction of labelled mitoses.
$G_0$  A phase of post-mitotic proliferative quiescence.
$G_1$  The phase between mitosis and the beginning of DNA synthesis.
$G_2$  The phase between the completion of DNA synthesis and the beginning of mitosis.
$I_M$  The mitotic index; the proportion of cells in mitosis.
$I_{Meta}$ The metaphase index; the proportion of cells in metaphase.
$I_P$  The growth fraction; the ratio of proliferating to non-proliferating cells.
$I_S$  The flash $[^3]H$-TdR labelling index; the proportion of cells labelled after a brief exposure (usually one hour) of the tissue to $[^3]H$-TdR.
$I_{Sexpt}$ The experimental (observed) flash $[^3]H$-TdR labelling index.
$I_{S Theor}$ The theoretical flash $[^3]H$-TdR labelling index, equivalent to $I_{Sexpt}$ if all cells in the population are proliferating.
$k_B$  The birth rate of new cells.
$k_G$  The overall growth rate of the population (equivalent to the birth rate if no cell loss).
$k_L$  The rate of cell loss, found by subtraction of $k_G$ from $k_B$.
$M$    The phase of mitosis.
$P$    Those cells born into the proliferative compartment.
$\Phi$ (phi) The cell loss factor; the ratio of the cell loss rate to the cell birth rate.
$Q$    Those cells born into the non-proliferative (quiescent) compartment.
$r_M$  The rate at which cells enter mitosis.
$r_S$  The rate at which cells enter DNA synthesis.
$S$    The phase of DNA synthesis.
$T_C$  The cell cycle time; the time between the completion of mitosis and the next mitosis in one or both of the daughter cells.
$T_C(\omega)$ The apparent cell cycle time; the time taken to replace all the cells in the population (equals $T_C$ when the growth fraction is unity).
$t_D$  The population doubling time, ideally related to a doubling of cell number, but more usually to a doubling of weight or volume.
$t_{G_1}$ The duration of the $G_1$ phase.
$t_{G_2}$ The duration of the $G_2$ phase.
$t_M$ The duration of the mitotic phase.
$t_{PD}$ The potential doubling time, the expected time taken for the cell population to double in number based upon the rate of cell production (used in the context of exponentially growing populations). Equals $t_D$ if there is no cell loss.
$t_S$ The duration of the DNA synthesis phase.
$T_T$ The transit time, usually within the context of a compartment.
$T$ The turnover time; the time taken to replace all the cells in the population. Equivalent in duration to $t_{PD}$, but a more appropriate term in situations where the population size remains constant.
$t_2$ $t_{G_2} + \frac{1}{2} t_M$. 