

The mechanism of tissue regeneration from the point of physical chemistry

M. Ponizovskiy

Kiev Regional P/N Hospital, Ukraine

The mechanism of tissue regeneration depends on development cellular cycle which displays phenomenon “contact inhibition propagating cells of the healthy tissue” and reflects normal tissue regeneration. The mechanism of development cellular cycle occurs via proliferative processes which progress via alternating shifts cellular balance catabolic and anabolic processes into anabolic processes in G1 and S phases cellular cycle with shifts between as endocytosis and cumulating substances and energy in G1 and S phases as well as alternative outflow energy and substances uniformly distributed within new forming propagating cells via Mitosis and G2 phases cellular cycle. Taken into account that it maintains the subsequence phases G1 and S phases and then Mitosis and G2 phases cellular cycle, all these processes must advance due to proliferative processes depending on mechanism of permeability membrane cellular wall. Hence it's possibility to explain the mechanism of “contact inhibition propagating cells of the healthy tissue” and mechanism tissue regeneration from the point of view of physical chemistry using Theorell formula.

Here is Theorell formula: $dn/dt = -UcA d\mu/dx$; [dn/dt – quantity of diffusing substance molecules in the unit time; U – substance mobility; c – substance concentration; A – membrane area; μ – chemical potential; x – molecule distance from membrane]. Chemical potential (μ) is the driving mechanism for both active and passive transports substances across cellular membranes. It's necessary to take into account, that cells of the same layer of any tissue comprise approximately identical substance concentration (c), having identical mobility (U), identical area of cellular membranes (A), identical molecule distance from the cell membrane (x). In the normal tissue the absence of substance diffusion (dn/dt) through the cellular membranes of tissue due to the circumferential cell contact to the other cells is explained by the availability in all those cells the identical chemical potentials ($\mu_1 = \mu_2 = \mu_3$ etc.) that influences the decrease of cellular membranes permeability and the decrease of substance diffusion (dn/dt) through the cellular membranes. Therefore “G1phase” of the cellular cycle isn't filled with substances due to identical chemical potentials of intracellular Medium and extracellular Medium each cell, and there takes place “contact cellular inhibition of propagating cells” in the normal tissue. The part of cellular membrane free from the cellular contact separates the cellular chemical potential from another Environment chemical potential ($\mu_{cell} \neq \mu_{environment}$), i.e. the different chemical potentials of intracellular Medium and extracellular Medium each cell. Therefore “contact inhibition of cell propagation” is absent here due to the increase of cellular membranes permeability and the increase of substance diffusion (dn/dt) through cellular membranes filling “G1 phase” of cellular cycle. Thus it occurs as the mechanism of tissue regeneration promoting wound healing and as well as the mechanisms of growth of epidermal epithelium, nails and hairs.

Biography

M. Ponizovskiy possess degree PhD at the age of 40 years. In a current of 10 years he worked as the therapist in clinical hospital of Darnitsky area of Kiev [Ukraine]. In 1969 he worked in Palladin Biochemical Institute of Academy sciences of Ukraine in department “Biochemistry of growth” / the Head of department professor Korotkoruchka V.P./ Since 1970 he have received qualification the doctor of the laboratory and continued to co-operate with department of academician Belitser of Palladin Biochemical Institute. HE together with several employees of department have published some articles in journal Experimental biology and medicine. Working as the Head of clinical and biochemical laboratory he have also published annually articles in journals “Laboratory affair” and “Actual of a problem of medicine and biology”. Since 1990 he also worked as the Head of toxicological laboratory of the Kiev regional p/n hospital. Simultaneously he worked having a second job as the doctor of emergency ambulance. Besides I was explained the mechanism of this method treatment, using the concept of Warburg effect mechanism, which was published in the journal “Critical Reviews in Eukaryotic Gene Expression”, 2010, 20 (4), 325 - 339.

ponis@online.de