

Role of Epigenetics in the Planning of Surgeries, a Review and a Proposal to be Considered

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Beyond question, surgeries in general impose a stress on the patient, emotionally [1] and biological triggering chemical alarm systems, which can affect the results of the surgery [1-3].

A high level of oxidative stress is a very important factor in a low immunity and hence potential complications are generated. Toxic substances in sterile inflammations such as myeloperoxidase [4] can achieve a compromised immune system response; even antibiotics may generate reactive species of oxygen that causes oxidative stress, membranes and cellular DNA damage [5]. Patients with conditions such as diabetes [6], arthritis, autoimmune diseases [7], cellular senescence [8], excessive inflammation [9] already may suffer high levels of oxidative stress, bringing forth a statistic of higher complications, such as infections [10], scarring [8], increased mortality [11], among others.

Apart from the typical pre-surgery exams, the internal medicine evaluation test, we must bethink in something more far reaching, all inclusive.

“Knowing the total cell number of the human body as well as of individual organs is important from a cultural, biological, medical and comparative modelling point of view. The presented cell count could be a starting point for a common effort to complete the total calculation. These partial data correspond to a total number of 3.72×10^{14} [12]. (Bianconi *et al.* Ann Hum Biol. 2013 Nov-Dec; 40(6):463-71. An estimation of the number of cells in the human body.)

Damage to DNA due to environmental aggression and normal metabolic processes amounts to an estimated of 1,000 to 1,000,000 of molecular lesions per cell per day. While this hardly constitutes only a 0.000165% of the human genome, approximately 6 trillion bases (3 billions of base pairs), the unrepaired lesions in critical genes such as tumor suppressor genes may prevent the ability of the cell to avoid tumor formation (Lodish H, Berk A, *et al.* (2004), *Molecular Biology of the Cell*, p963, WH Freeman: New York, NY.), with this struggle of oxidation and molecular damage to DNA, we could advance in reaching an ideal approach to metabolic [13] homeostasis through the application of EPIGENETICS.

Epigenetics, a term coined in 1942 (Conrad Hal Waddington) refers to the changes heritable in the DNA and histones that don't implicate alterations in the nucleotide sequence and modify the structure and condensation of chromatin, so they affect gene expression and phenotype. Epigenetic modifications are methylation of the DNA and histone modifications [14]; it's important to envision epigenetics and the aspects that affect positively the performance of certain genes against external factors.

Nutrition is essential in the role of immunity by interfering with the synthesis of pro inflammatory cytokines, immune regulation, and gene expression. Polyphenols bring into play a variety of biological activities [15]; they are organic compounds of many phenol rings, they play a very important role in the plants, and their actions can be qualified in six aspects: release or suppression of Auxin growth hormones, protection against UV rays in the form of pigments, defense against herbivores and antimicrobial defenses (phytoalexins), a process of maturation and growth. There is evidence that polyphenols affect the "Quorum sense of bacteria, affecting the genomic expression of invading agents [16]."

A significant percentage of the population in the western world and in developing countries show that they are not consuming enough polyphenols in their diet because of low devour of fruits and vegetables, even though there is much evidence that large quantities of polyphenols in the diet have a good effect [17]. Polyphenolic compounds (Phytoalexins) have many of them the particularity of achieving high expression of NEF2 a Zip Leucine master factor in the antioxidant response at the genomic level [18]. Therefore, we recommend reviewing the literature to administer certain compounds of standardized extracts prior to surgery, as are the extracts of *Curcuma Longa* and *Camelia Sinensis*, since we could expect an improvement in the immunological system through the favorable epigenetics of these compounds [15], particularly when patients are accompanied by diseases of high oxidative stress such as Diabetes Mellitus, which must be controlled and the patient aware of his responsibility for his health; on the other hand, doctors should consider the potential benefits that lavishes the addition of diets and supplements based on polyphenols, that can contribute in the repair and improvement of mitochondrial function [19-21].

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