

EPIGENETICS AND IMMUNE RESPONSE (a review)

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From a biological point of view, the complex diseases are all multifactorial syndromes, which means that the susceptibility to the disease is determined by interactions between multiple genes, gene networks, but also involves important covalent and reversible modifications of DNA by non-genetic (epigenomic), environmental factors. Many proofs were collected, that complex physiological functions, such as immune regulation are also influenced by multiple epigenetic factors (i.e. DNA methylation, chromatin rearrangements, a set of small RNA entities and telomerase). In the last years immense amounts of genetic data were collected (e.g. GWAS/ENCODE results). Although we may know the DNA sequences and variants in a genome, the uncovering the way of ontogeny of immune system, the precise action of protein- and RNA-based regulatory factors in a cell resulting in genes turning on and off requires epigenetic studies, as well. One cannot avoid a further, provocative question whether which epigenetic modifications (a „cell memory”) could even be transmitted to the next generation of an organism via meiotic proliferation? This last question is very important since it raises the point as to whether our lifestyle affecting the epigenetic modifications can influence the physiology (i.e. immune activity) of our children and grand-children. It seems rather convincing, that the conscious change of the lifestyle (e.g. diet, exercise, stress management, psycho-social elements, etc), may basically alter the outcome of the potential of the immune defense, complex diseases and life-span.