

# Endless research II. The genomic era. Neohippocratic Medicine

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## Abstract

The great progress of genetics research, during 2015-2017, will certainly influence all medical specialties including nuclear medicine. In nuclear medicine there are still problems to solve as to differentiate between infection, inflammation and cancer etc. Furthermore, in dosimetry and radiation protection there are worldwide problems. It has been reported that  $^{64}\text{Cu}$ -cetuximab immune-PET represented EGFR expression levels in ESCC tumors and that  $^{177}\text{Lu}$ -cetuximab radioimmunotherapy effectively inhibited the tumor growth. Recent important research findings and few related suggestions for further research are mentioned related to Gastroenterology, Neohippocratic Medicine, the Respiratory System, Neurology and the Hayflick phenomenon. Perhaps we now live in the genetics transformation era, the Genomie's Era.

## Nuclear Medicine

The great progress of genetics research, during 2015-2017, will certainly influence all medical specialties including nuclear medicine. In nuclear medicine there are still problems to solve as mentioned in a previous paper [1] such as to differentiate between infection, inflammation and cancer, between lymphomas and adenocarcinomas or between acute and chronic inflammatory processes [2].

Furthermore, in dosimetry and radiation burden are worldwide problems. In HJNM we have previously published related papers [3-6]. Not to mention radiation sickness due to atomic or hydrogen bombs [7]. We suggest that medical physicists may be asked to complete a kind of "Radiations Medical Identity Card" every time one receives radiations from medical procedures. Hormesis may also be considered [4]. As we know, children are more sensitive to radiation, especially is childrens' brain [8, 9].

Immunotherapy which is widely used for cancer treatment is usually not specific to cancer cells [10-14]. It has been reported that  $^{64}\text{Cu}$ -cetuximab immune-PET represented epithelial growth factor receptor (EGFR) expression levels in esophageal squamous cells carcinoma (ESCC) tumors and that  $^{177}\text{Lu}$ -cetuximab radioimmunotherapy effectively inhibited this tumor growth [13]. May we recall again some details that make lymphatic system unique i.e. some lymph vessels have valves and function like small hearts. Furthermore, spleen is the largest lymph cells producing organ of our body [1]. It has been shown recently that basic functions of our body like cellular informations are transmitted by RNA to DNA. Furthermore, genes may be influenced by many factors and thus can finally influence our health and everyday behavior. Perhaps we now live in genetics transformation era, the Genomie's Era, which may have in the future a great impact not only to Medicine but also to our Social Ethics and Civilization.

## Gastroenterology

In gastroenterology we may wish to study how long it will take not only to digest but also to metabolize our meals i.e a vegetarian, a protein rich or a lipids rich meal. Half gastric emptying time is only a part of the whole study.

Hippocrates strongly suggested to avoid breakfast and have only lunch and dinner [1]. As mentioned before [1] lipids need 16-18h to be digested and metabolized and only if we avoid breakfast there is enough time for that [1, 15, 16]. Let us mention that drinking tea may inhibit enteric absorption due to tannin it contains. This may refer to lipids absorption too.

What about appetite? It was found that our desire for sweets originates in the liver where carbohydrates intake activate the expression of fibroblast growth factor 21 (FGF21). This factor acts on hypothalamus to turn off the craving. Thus desire for sweets does not always mean diabetes [17].

It has been reported that gut infectious bacteria like salmonella and E. coli, when attached to the intestinal wall can modify their genes according to their environment [18]. Can this apply to Koch's bacillus for tuberculosis? Can these bacteria induce intestinal hyperplasia? During the 2<sup>nd</sup> world war there were reported cases of tumor-like hyperplasia in the caecum in cases of intestinal tuberculosis. Furthermore, it has been reported that enterobacteria can make the host cell more susceptible to infection [18].

## Neohippocratic Medicine

Neohippocratic Medicine includes Hippocrates and others simple observations which are beneficiary to Health and Medicine and are supported by medical data.

Neohippocratic Medicine was first described by us during the 3<sup>rd</sup> International Medical Olympicus Association Meeting or Olympiad, in Thessaloniki on 2015 and more are to be presented during the 4<sup>th</sup> Medical Olympiad in 3-5 November this year. Hippocrates considered diet and hereditary factors as the main nosogenic factors in men. Recent research confirms that: "The food we eat controls our genes" [19].

## Respiratory system

According to Hippocrates: "Synchopnea (many short breaths) indicates pain, stress or infection above the diaphragm" (or fatigue). "Normal breath offers great strength to men". During synchopnea the lower pulmonary lobes and the diaphragm remain hypoventilated [20, 21].

As mentioned before [1], inspiration offers energetically oxygen and expiration exhales carbon dioxide (CO<sub>2</sub>). The diaphragm, the respiratory muscles and the positive-negative pressure in the lungs exchange oxygen for CO<sub>2</sub>, offering oxygen to vital organs. This procedure is related to the key test we use for normal lung function which is the forcefully expired gas volume during the first sec after a full inspiration (FEV<sub>1</sub>) [20, 21].

New evidence indicates that rhinovirus-triggered asthma exacerbations become more severe as the degree of sensitization to dust mite increases. The two biggest drivers of asthma severity are allergy pathway starting with allergic sensitization and an environmental tobacco smoke pathway. In addition, allergic sensitization and blood eosinophils can be used to select medications for management of early asthma in young children [22]. Two olfactory receptors in lungs regulate induce contraction of human airway smooth muscle cells of the bronchi [23].

## Neurology

Recent research is extraordinary and advancing: The engineered CAR-T cells immunotherapy significantly improve survival in glioblastoma mouse models and decrease brain tumor growth by 60% as compared to controls [24].

A recent paper identifies the gene networks that control human intelligence [25].

## The Hayflick phenomenon

The Hayflick phenomenon refers to the ability of the trust cells of our body to grow and reproduce as we mature and to finally transform a baby into an old man. Dr. Leonard Hayflick arbitrarily considered that all our embryonic cells can reproduce about 150 times [26]. Does this mean that we are scheduled to live longer than 100 years? [27]. What tactic is best to follow? We may suggest: "Live in measure" as Kleovoulos, from the island of Rhodes, one of the seven wise men of ancient Greece said about 2600 years ago. This is true as for our diet, body weight, sex, sleep etc. We think that sleep for old atherosclerotic men should be about 10 hours per day. High serum levels of testosterone if without physical activity may induce heart problems. Reasonable mental and physical activity are also advised. Men over 80 years should work not more than 3-4 hours per day. It has been reported that workers working 55h per 7 days had 33% more stroke and 13% more cardiovascular episodes than those working 35 hours

per 7 days [28].

Studies in animals showed reprogramming of epithelial cells to aid regeneration [29]. Other studies have identified genes that drive early human development from oocyte to embryo [30]. Furthermore, related to Hayflick suggestion, researchers have found a gene that can increase lifespan [31].

*It is also worth mentioning* that scientists have created from bacteria, electrical wires that are thousands of times thinner than a human hair [32]. May be in the future we could combine minute electronic transistors, minute wires and nanotechnology to manufacture diagnostic devices-scanners of a much smaller size to be used in Nuclear Medicine.

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The best view of Prague with the castle, the cathedral of St. Vito and Charles's bridge of Moldava river.