

## Better Healthcare and Nutrition: Applications of Genetics

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Genetics is the future of medicine and yet, ‘it has always been the backbone of medicine’.<sup>[1]</sup> The world is now past the ten year anniversary of the sequencing of the human genome.<sup>[2]</sup> Neil Armstrong’s quote can be used to define the genome sequencing as – “one small step for man, one giant leap for mankind”.

This small step of knowledge can lead to leaps of benefit to mankind, and one may be forced to think, “how”. What does the future have in store for healthcare? Will a ‘disruptive’ technology, bring new concepts, not just new machines, to treat people, at a more basic level, in a smarter manner.

In almost every discussion on the state of healthcare, the main issue is around the healthcare costs. There is the cost of land, cost of building, and yet both don’t add any value to the health of an individual, but he is made to pay for it. Added to it is the cost of the healthcare itself- the machines, the manpower-skilled and unskilled, and the cost of the drugs. However the entire healthcare system of today relies on curative medicine. Let the disease manifest itself, first unseen, unheard, and then let it grow, unseen, unheard, then let it be showcased, and then let the patient search the right hospital right doctor, and then the treatment shall start. The disease has progressed, added disability, and increased the curative healthcare costs of the patients.

One fundamental way to reduce this non value added cost, and to restore the life of a patient sooner, could be preventive medicine, or early diagnosis, and that is the heart of medical genetics. The question is, how will this knowledge transform the existing healthcare systems, the hospitals, the public health, and the life of an individual?

This short commentary focuses on two main issues, the first is review of genetics as a tool for one of the biggest problems of public health across the world- malnutrition. And the second is envisaging, the hospitals of tomorrow. It seems that these are two diverse topics and should be covered separately,

however that’s not true. Both are interlinked and related.

There is a common saying- ‘we are what we eat’. A breakthrough article published in *Nature Microbiology*, supports this scientifically. The authors- an international team led by Dr. Markus Ralser of the University of Cambridge and the Francis Crick Institute in London, both in the UK- conclude that “nearly all of our genes may be influenced by the food we eat”.<sup>[3]</sup> They have stated, “The classical view is that genes control how nutrients are broken down into important molecules, but we’ve shown that the opposite is true, too: how the nutrients break down affects how our genes behave.”<sup>[3]</sup>

For a healthier world, the nutritional value of the food has to increase. The stigma of malnutrition has to be addressed. “Genetic modification is being touted as the future of food.”<sup>[4]</sup>

“Today an estimated one billion people in developing countries already struggle to find enough food to meet their basic needs. Millions more suffer from the effects of an unhealthy diet in the developed world.”<sup>[5]</sup> To a person standing at the horizon of healthcare of the future, does this combined knowledge not raise many potential questions? Can we combine the genetic modification knowledge and technique, to our understanding of genome sequencing, to give tailor-made solutions for nutrition that can affect the behaviour of the genes, towards better health of an individual?

After all, the purpose of any scientific discovery should be for the betterment of the society. It is a valid question, and it may take time to give us the answers, but it definitely shows scope for more scientific work in a combined approach of various knowledge domains, because, no discipline in medicine and health of an individual can work in isolation or in a water tight compartment.

Infact with this approach, there can be a far greater revolution in healthcare, not only can there be reduction of malnutrition, but, simultaneously the activity of the disease triggering genes of the body may also be reversed. The article says that “cellular metabolism plays a more dynamic role in the cells than we previously thought. Nearly all of a cell’s genes are influenced by changes to the nutrients they have access to. Infact, in many cases the effects were so strong, that changing a cell’s metabolic profile could make some of its genes behave in a completely different manner.”<sup>[3]</sup>

So, one way to address healthcare is by better nutrients and altering gene behavior while solving malnutrition problems also.

If the genetic makeup of an individual reveals that he is pre disposed to a particular disease, then timely interventions can start, and quality of life can be increased. Health care costs can be greatly reduced-both to the patient and to the hospital. Doctors in London, used “experimental genetic therapy to slow down cancer in a one year old baby”.<sup>[6]</sup>

The hospitals of the future may not be like they look now. Information at the genetic level and with great support from IT, may become the ‘decision maker’ and prescribe a very individualistic health advice. The pharmacy industry may also function differently. The “knowledge about the basic elements of human genomes and their differences, both common and rare, is central to the concept of personalized medicine.”<sup>[7]</sup> Instead of buying a standard dose, specific may be given as per individual requirement based on how they metabolize the drugs as per their genes.

However laws will also have to be made to protect the genetic identities of the patient, and the insurance sector regulations also will have to be done, so that equal opportunities exist for all the people.

It’s a fast changing world of scientific discovery, and it is very exciting to live in this world because information and application of the genetic knowledge can bring about very effective, and very positive changes to the health of populations. Indeed one step of pure science in the lab, is like a giant step in application for mankind.

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