

The Tomorrow's Personalized Medicine – The Killer of Today's Statistical Medicine

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Today we practice statistical medicine: what else is treating patients according to the evidence based medicine data? The best diagnosis and treatment guidelines are based on the positive statistical results of clinical trials.

But what about the 10-20-40% patients in each study who did not respond appropriately to the therapy? Can we recognize them today before starting the statistically approved therapy, which will work only on the 90-80-60% statistically correct patients?

We do not recognize them yet. But soon we will do and will treat them differently from those who respond statistically normally.

Personalized medicine may perform the following steps, different for each patient according to his/her medical needs:

1. Analyzes the individual genetic heritage: DNA, RNA, may be proteomics (the basic compulsory tool)
2. Identifies the risk given by this genetic heritage for one or more diseases
3. Gives ways to prevent to that person the development of the disease at risk, with classical prevention methods or some prevention methods identified by the genetic heritage
4. For diagnostic purposes, gives a suggestion which diagnostic marker is appropriate to that person according to the genetic profile, in order to check correctly the diagnosis
5. Gives the major answer to which therapy responds that individual

Let us have a look to some of these aspects.

Our DNA genome changes constantly. There are portions which do not change and another percentage of DNA sequences which change continuously. Some sequences of 2-5 base pairs, called microsatellites, change to-

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Article received on the 23rd of June 2014. Article accepted on the 26th of June 2014.

gether and are the most important DNA sequences which predispose to a disease. Such changes appear in the 13 000 genes which raise the risk of cancer, diabetes, Alzheimer's disease and other. The changes occur with a speed and an amount of up to 100 times slower or faster between individuals (1). What is important, these changes accelerate dramatically with age, raising the risk of diseases dependent on age. This makes the personalized medicine more difficult, because an individual genomic analysis is no more valid after a number of years and has to be repeated, because it changed (1).

Here is a list of diseases which have a strong genetic component: cancer, diabetes, Alzheimer's disease, rheumatoid arthritis, COPD, glaucoma, depression and some cardiovascular disease (myocardial infarction, hypertension). Classically we ask for antecedents, a very weak tool. Today we have to ask for genomic analyses and the answer is already very strong, regarding prevention methods and, especially, the response to therapy.

Here is a list of the percentage of the population in which a particular drug is ineffective (2):

- Anti-depressants 38%
- Asthma drugs 40%
- Diabetes drugs 43%
- Arthritis drugs 50%
- Alzheimer's drugs 70%
- Cancer drugs 75%

Today we may identify by genomic analyses who will be the responder. More than 10% of the prospects which accompany new drugs approved by FDA do contain today genomic information.

The most spectacular achievements of the personalized medicine are today in oncology. Here are some examples of drugs which act in different cancers only to individuals identified by the corresponding tests (3): Herceptin (trastuzumab) for metastatic breast cancer, Erbitux (cetuximab) for metastatic colon cancer or Gleevec (imatinib) for gastric stromal tumors.

It is beyond the purpose of this paper to debate the practical results existing today in each of the described fields. The landscape changes dramatically every month. We suggest just one journal which reflects the level of the news: Journal of Personalized Medicine, which has an Impact Factor greater than 12 and has monthly several editorials free on the internet. Our journal has preoccupation in the field as well (4).

The diagnostic tools to identify the therapeutic responders are imperfect. Our genome changes dramatically over time and more rapidly at advanced age. Very few drugs have the identified corresponding marker which informs about its efficacy in an individual.

However these tools exist and develop dramatically in many fields of medicine. They address to strong drugs, acting in dramatic illness often without another efficient therapeutic option.

It is clear that in a close future our today students will practice as doctors another medicine: that dedicated to the patient in face of them and not dedicated to a large statistical group validated by the today's guidelines.

Conflict of interests: none declared.

Financial support: none declared.

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