

THE ART AND SCIENCE OF MEDICINE

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As we grow older and we cross the shadow line, we begin to wonder what is the profession which has consumed our life. Between August and September 1957 Pablo Picasso closed the door of his studio and faced the challenge of *Las Meniñas* of Velázquez. He changed the vertical format to the horizontal and opened the great window. Then in a boundless game of imagination he metamorphosed the figures. The principal focus of Picasso's attention was a little girl, the Infanta Margarita. Picasso devoted 14 studies exclusively to her; decomposing and composing her; trying to get her essence, to break to the heart of the matter (Fig.1). Now, if we try to get in a



Fig. 1. The Infanta Margarita by Velázquez (left) and Picasso (right).

similar way to the essence of medicine we might end up with the head of the Infanta Margarita split in half, exemplifying the two faces of medicine: art and science (Fig. 2). Do they, indeed, represent two entirely different categories of being, between which there can be no easy discursive account? Or is this split rather artificial?

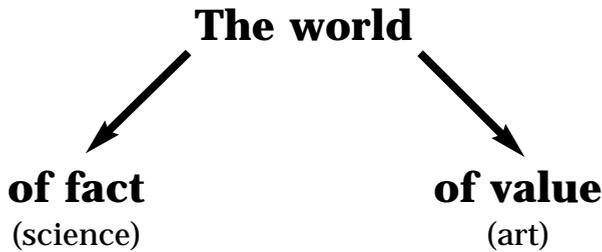


Fig. 2. Is the split between culture and science real or artificial?

Medicine and art emerged from the same source, i.e. magic, characterized by the omnipotent power of the word. It was the word, that if pronounced properly, could expel the disease or cause it, bring rain or drought, disclose the future, or bring back the dead relatives. The pre-modern medicine set great store by a highly personal clinical relationship between the doctor and the patient and emphasized the personal experience in diagnosing and treating the individual case as the royal road to successful healing. A radical transformation of medicine occurred over the last century with medicine becoming a specialized, high-tech endeavor with ever increasing aspiration to become science, or at best a science-based art.

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Hippocrates considered medicine *techne*. Plato called it art. The Hippocratic physicians identified the healing power of nature [1]. Doctors, they taught, are merely nature's servants. They took their diagnosis and therapeutic cues from what they could observe at the bedside – patients suffering from acute illness often are pale, jaundiced or flushed, they sweat, vomit, cough up phlegm or blood, develop pustules or rashes. The Hippocratics interpreted these signs and symptoms as evidence that the body is a marvelous mechanism with a natural capacity to restore the humoral balance which determines health. Pythagoreans conceived the idea that medicine

leads to katharsis of the body, while music results in katharsis (purification) of the soul. Since Aristotle the meaning of the word katharsis [2] became an enigma in art and a source of endless disputes over millennia.

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We owe to the ancient Greek mythology, this ‘most thoughtful vision of the tissue reflecting our existence’ [3]. Socrates thought that we enter the mythical when we enter the realm of risk, and myth is the enchantment we generate in ourselves in such moments. It is a spell the soul casts on itself [4]. In the early times, Greeks believed, things were not imprisoned in one form, they could change, metamorphose. Ancient Greeks were fascinated by this phenomenon which they called polymorphism. Thus, Zeus would transform himself into a white bull to carry away Europa, or into a swan in burning necessity in front of Leda. And at the very last moment when Daphne was to be caught by Apollo, leaves started to grow from her fingers and she turned out into a laurel tree (Fig. 3).



Fig. 3. Apollo and Daphne by Giovanni Lorenzo Bernini (1622-1625). Galleria Borghese, Roma.

Polymorphisms are widespread in the human genome [5]. There are a number of ways to categorize them. When classified according to the mechanism, point mutations – that is, a change in a single DNA letter (the base) in the sequence – are most common. Such substitution in one letter of DNA is called single nucleotide polymorphism (SNP) (Fig. 4). It may lead to an alternative amino acid, because of the way it changes the three-base sequence, or codon, that codes for an amino acid. In the genetic code of man (DNA), one letter (nucleotide) per one thousand is replaced by another, giving rise to SNPs. Every day scientists are discovering new SNPs; their number is now over 2 millions. In terms of functional effects most SNPs are silent, their role is negligible, but sometimes they might be responsible for appearance of a particular trait predisposing to a disease [6-8]. (Fig. 5). Long stretches of DNA with a distinctive pattern of SNPs are called haplotypes. Successive haplotypes can combine in many different ways. Last November the U.S. National Institute of Health announced [9] that it has garnered the \$ 100 million necessary to construct a so-called haplotype map (the HapMap). A popular theory is that haplotypes could mean the difference between health and

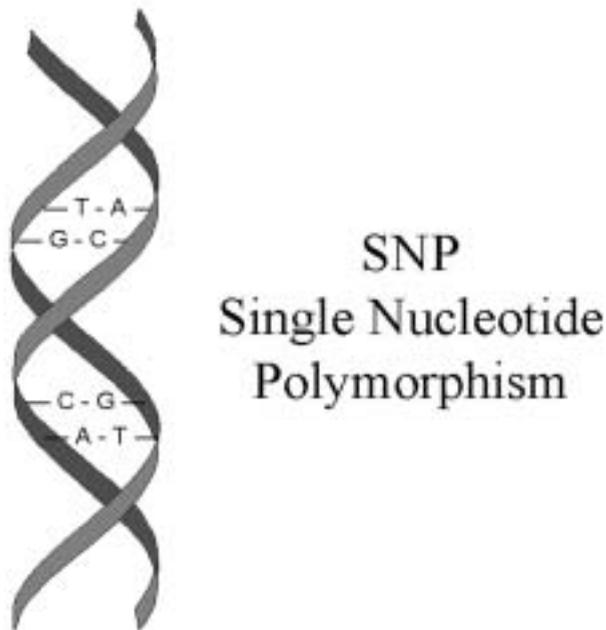


Fig. 4. The change of one nucleotide for another in a four-letter genetic code (A,C,G,T) constitutes the most common polymorphism (SNP) in human DNA.

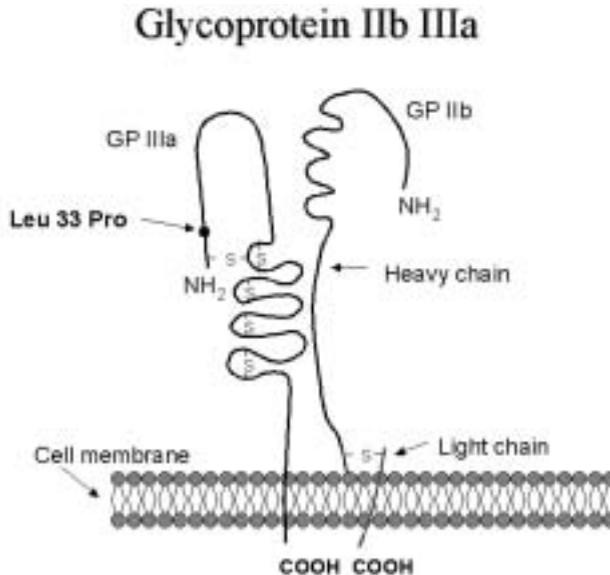


Fig. 5. A substitution of one nucleotide by another in the gene coding of the molecule of glycoprotein IIb/IIIa leads to change of one amino acid (leucine for proline) in the functional region on the surface of blood platelets. Such variant molecules are present in about 25% of Europeans and Americans; they facilitate blood clotting and, in consequence, predispose to heart attack and stroke.

ailments ranging from cancer to diabetes. If Zeus were to look at us today he would smile seeing how we find deep in ourselves polymorphisms which millennia ago were supposed to be the feature of gods.

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Science and technology have become the new religion. They are looked upon as the origin of all sorts of freedom and all sorts of material goods. There is growing belief that medical science will ultimately take away all the ills of the world. Is science, indeed, able to answer the questions we might pose about the world? It is essential to realize not only the exceptional power of science, but also its limitations [10]. First, there is the limiting fact that quantum theory, our best scientific theory thus far, involves the inherent uncertainty associated with any measurement of a physical

system. Then comes the self-referential fact that the very tools we use to probe nature are themselves part of nature. And finally, and most importantly, there is science's inherent inability to cope with anything unique, sometimes labeled 'origin problems' [11].

Science is just one of several ways of searching for truth. Truths of science stand beside the revealed truths of religion, the persuasive truths of humanities and the demonstrable truths of mathematics. And there are also 'magical truths' [10], complementary to science, associated with the non-material, human forces in the world, such as poetry, music and the fine arts.

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Medicine's commitment to the patient is being challenged by external forces within our societies. Changes in the healthcare delivery systems in countries throughout the industrialized world threaten the values of professionalism [12]. Business ideology infiltrated healthcare when costs spiraled and governments reconsidered their long-standing commitment to the welfare states. The conditions of medical practice are tempting physicians to abandon their commitment to the primacy of patient welfare. 'Mediocrity became the benchmark for running a health service. Priorities shifted. Quality was eroded by a concern for quantity (...) Morale collapsed, cynicisms became commonplace'. These are very strong words. They come from the editor-in-chief of the prestigious *The Lancet* [13].

But medicine is governed by the ethos, not a balance sheet. Market forces, societal pressures, and administrative exigencies must not compromise the fundamental issue of patient welfare. Physicians both in Europe and in the USA have very recently developed a set of principles to which all medical professionals can and should aspire [14]. It reaffirms the fundamental and universal principles and values of medicinal profession and provides a new insight into medicine as both an art and science.

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Medicine throughout most of its recorded history must be seen more as an art than science. It was only recently that radical transformation of medicine put it on a scientific path on search for truth. Let us then ask: What is truth? 'Truth is the moving army of metaphors' answers F. Nietzsche [15]. If that statement about truth is true, then science meets art and medicine finds its place in this encounter.

REFERENCES

1. Bynum, W.F., 'Nature's helping hand'. *Nature* 2001; 114:21.
2. Szczeklik, A., *Katharsis*. Znak. Kraków, 2002.
3. Brodsky, J., Preface to *The Marriage of Cadmus and Harmony* by R. Calasso Vintage, London, 1994.
4. Calasso, R., *The Marriage of Cadmus and Harmony*. Vintage, London 1994; p.278
5. Guttmacher, A.E. and Collins, F.S., 'Genomic Medicine. A Primer'. *New Engl J Med* 2002; 347:1512-21
6. Sanak, M., Simon, H.-U., Szczeklik, A., 'Leukotriene C₄ synthase promoter polymorphism and risk of aspirin-induced asthma'. *Lancet* 1997; 350:1599-600.
7. Szczeklik, A., Musiał, J., Undas, A., *Reasons for resistance to aspirin in cardiovascular disease*. *Circulation* 2002;106:181e-182e.
8. Undas, A., Sydor, W.J., Brummel, K., Musiał, J., Mann, K.G., Szczeklik, A., 'Aspirin alters the cardioprotective effects of the factor XIII Va 134 Leu polymorphism'. *Circulation* 2003; 107:17-20.
9. Conzin, H., 'HapMap launched with pledges of \$100 million'. *Science* 2002; 298:941-942.
10. Ridley, B.K., *On science*. Routledge. London and New York, 2001 p. 34
11. Casti, J., 'The world of testable truths'. *Nature* 2001, 414:254.
12. Editorial: 'Just how tainted has medicine become?'. *Lancet* 2002; 359:1167.
13. Horton, R., 'The doctor's role in advocacy'. *Lancet* 2002; 358:458.
14. 'Medical Professionalism in New Millennium: A Physician Charter'. *Ann Internal Med* 2002; 136:243-253.
15. Nietzsche, F., in: R. Calasso, *Literature and Gods*. New York 2001, A. Knopf, p. 184.

DISCUSSION ON THE PAPER BY SZCZEKLIK

MENON: Thank you very much, Professor Szczeklik, for that illuminating talk which ended on a very high note concerning ethics and morals and human behaviour. Now, could I have just two brief questions? We do not have time for a long discussion. The questions will have to be brief. Professor Jaki.

JAKI: Your last remark, a quotation from Nietzsche about truth being an army of metaphors...

SZCZEKLIK: A marching army.

JAKI: A marching army. Is that statement a metaphor itself?

SZCZEKLIK: That probably will lead us to metascience.

JAKI: It is not.

SZCZEKLIK: In a way it is, in a way, you are right. I just like this definition, but this will open a long discussion: what really is truth?

MENON: That sort of comment would have to be discussed personally because it's like discussing poetry, if I may say so. Is there another question for Dr. Szczeklik? We have had a very illuminating lecture; there is really no question. There are a lot of questions one could ask, but we are limited by time, and the President has given me strict instructions on that matter. Thank you very much, the session is closed.