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Moving to the dark side: Personalized medicine revisited.

Peter A. Rinck

I received a number of comments concerning my last column about personalized medicine based on an individual's complete genetic structure [1]. Some responses were nodding assent, while others followed the general tenor: "You don't see or don't want to see the way of progress."

Swimming with the scientific tide doesn't necessarily mean clinging to progress. Let's have a short look back in medicine, and perhaps then we can reach common ground.

Swimming with the scientific tide doesn't necessarily mean clinging to progress.

Not too long ago, frontal lobotomy was the latest craze in the cure of a number of psychiatric conditions – for patients with schizophrenia, dementia, mania, anxiety, and paranoia. It's a barbaric operation – in the early days, it was very invasive, but later the brain was reached through the eye socket. Side effects such as death were common. In the 1950s and 1960s, drug therapy slowly replaced this kind of brain surgery.

There were similar operations, such as prophylactic tonsillectomy in children, prophylactic appendectomy, and spleen removal.

How can one cure fatigue, headache, loss of appetite, and irritability? Ilya Ilyich Mechnikov received the Nobel Prize in Medicine in 1908 for his work on phagocytosis. He also believed in autointoxication caused by toxins forming in the colon, then absorbed and poisoning the body. This theory, in turn, led Sir William Arbuthnot Lane in London, as well as other surgeons, to propagate colectomies to cure this "disease." By the 1920s, they fell into disrepute as scientific advances failed to give support [2].

Returning to our enlightened medical age, and research into genetics and "personalized medicine." Some time ago, the genes BRCA1 and BRCA2 were described and patented (sic!) by a company in the United States. These genes are claimed to be associated with hereditary forms of breast and ovarian cancer. Women who have inherited mutations in these genes may face a much higher risk of developing breast and ovarian cancer compared with the general population. The American Cancer Society offers the following advice:

"Removing both breasts before cancer is diagnosed can greatly reduce the risk of breast cancer (by up to 97%) ... Some women with BRCA mutations will develop breast cancer early in life, and have a very high risk of getting a second breast cancer. Prophylactic mastectomy before the cancer occurs might add many years to their lives. But while most women with BRCA mutations develop breast cancer, some don't. These women would not benefit from the surgery, but they would still have to deal with its after effects. [3]"

And the American Cancer Society adds: "It is important that women with a BRCA mutation recognize they also have a high risk of developing ovarian cancer. Most doctors recommend that women with BRCA mutations have their ovaries surgically removed once they finish having children to lower this risk."

To be on the legally safe side, it also states:

"Genetic tests do not give precise answers about inherited diseases, especially about breast and colon cancer. A positive test result does not always mean you will get the disease. The test can tell what might happen, but it cannot tell what will happen. On the other hand, a negative result does not mean you have no risk of getting the disease. [4]"

As I see it, for "personalized medicine" based on individual genetic information, it will take decades to amass the knowledge required to make intelligent conclusions. For instance, there is the need to understand the impact of environmental factors – epigenet-

ic or otherwise –for the ultimate manifestation of a multifactorial disease, even if there is a significant genetic component.

It is still completely unknown whether a constructive therapy at the root of the problem will ever be found – which leaves the question: Does this mean that for the next generations of patients (and physicians) we might have to live with the results of half-baked, immature, and misunderstood medical treatment?

What happens if it is found that a certain gene mutation can be connected to eye tumors? Will the eyes be removed as a preventive measure? Who determines which organ is necessary and which can be disposed of? Should certain people be sterilized as it was commonplace in many countries until some time ago? Should there be prophylactic abortions?

There is a deep helplessness in this kind of solution. Going back into the dark ages of amputation and mutilation is a strange outcome of "personalized medicine."

Again, I have nothing against research and new strategies in medicine. However: *Quidquid agis, prudenter agas, et respice finem*, which means "Whatever you do, do cautiously, and look to the end."

In other words: weigh up the consequences.

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Nobel prose pageant – Peter Mansfield publishes his autobiography

Peter A. Rinck

Peter Mansfield was born on 9 October 1933 in London. Seventy years later, on 6 October 2003 he received a telephone call from Stockholm to inform him that he would share the 2003 Nobel Prize in Physiology or Medicine. His recently published autobiography covers these decades: *The long road to Stockholm* [1]. It is an enlarged version of his autobiography for the Nobel Prize presentation [2], with some personal background added – and an attempt to justify why he deserved the Nobel Prize.

There is something voyeuristic about reading autobiographies and memoirs, in particular if there is a prevailing feeling that the author accomplished something noteworthy. Yet, Mansfield's life resembles that of many people and university researchers who grew up during and after the second World War.

Mansfield describes his prewar and wartime childhood in southern England, his way to printer apprentice, evening-school studies and work in rocket propulsion development, his "salad days" at university, post-doc years at the University of Illinois, his sabbatical at the Max Planck Institute in Heidelberg in the early 1970s, and his career in academic physics at the University of Nottingham – including his famous patent fights and infamous department conflicts.

He cursorily mentions private matters and one follows his social rise – the advance of the son of a laborer and a waitress: late in his life, this son has become Sir Peter, the Nobel Prize winner. Yet, personal details are sparse and human insights and visions missing. His narrowness doesn't enlighten. The book is mostly laborious and anecdote-free, interspersed with leaden scientific details, sometimes going astray into tabloid-like descriptions of fellow scientists.

He puts down or belittles many people – be it friends as the radiologist Brian Worthington or foes as Paul C. Lauterbur: "One of the crowning moments for Brian was when he was elected Fellow of the Royal Society. I had proposed him ... Brian came to see me after his ceremony at the Royal Society and mentioned that he would very much like to be awarded the Gold Medal of the Royal College of Radiology (RCR). If awarded, this would be the pinnacle of his career in radiology. I said that I would do whatever I could do help him achieve this, especially since he was now a Fellow of the Royal Society. I wrote to the president of the RCR, who suggested that I send him a testimonial and the necessary background information ..."

Only Mansfield knows why he deals with Paul C. Lauterbur in a chapter entitled *Antagonisms to MRI*: "It appears that he [Paul Lauterbur] was working in clandestine manner with an industrial concern at the time in an effort to negate what we had already achieved and covered in patents. But it later transpired that the real reason he visited Nottingham so frequently was a cover for his visits to see Joan Dawson in London. He later divorced his wife to marry Joan. ... I include these details here simply to give an accurate representation of the story of MRI."

"The long road to Stockholm" is not the expected account of the makings of a Nobel laureate.

Mansfield's autobiography suffers from numerous factual errors: inaccurate dates, wrong places, mistaken identities, confabulated stories. It should have been professionally edited, shortened, and the fallacious cover text rewritten.

One wonders whether Oxford University Press still employs editors and proofreaders – or if they don't care any more about the contents of the books they publish. *The long road to Stockholm* is not the expected account of the makings of a Nobel laureate. The editors of a leading British weekly decided not to publish a review of the book. They considered that it was pretty poor work and they couldn't inflict this on their readers.

Peter Mansfield is a theoretician with deep understanding of the physics of NMR and MR imaging;

his main research area in the heyday of MRI application development was echo-planar imaging, the fastest known data acquisition technique. However, he never understood the world of what he calls the "medicos" and did not fathom that high image quality and spatial resolution might be more important to reach a diagnosis in clinical research and patient routine than the possibility to create blurry images or movies in less than a second. Today, echo-planar imaging has finally found its place in applications like diffusion and functional imaging.

As for many Europeans in the field, a stay in the United States opened Mansfield's eyes for the American way of science, as it was attainable for scientists until the late 1980s: freer, richer, more open, and less hierarchic than in Europe. His stay at the University of Illinois in Urbana-Champaign in Charles P. Slichter's research group in 1962 and 1963 allowed him to acquire the basics in NMR of solids. This was his first impression, a typical impression of a young European scientist arriving in the USA:

"When I first arrived in the group, I was the only postgraduate person present. Nevertheless I felt greatly inferior, because the range of knowledge that all the graduate students seemed to have of physics, electronics, and various other subjects appeared to me at the time greatly to exceed my own knowledge in these areas, particularly of theoretical physics."

With an interruption in 1972/1973 when he worked at the Max-Planck-Institut für Medizinische Forschung in Heidelberg, Mansfield spent the rest of his career in Nottingham. Raymond Andrew, a great and outstanding British NMR scientist of the time opened the doors for him at this university. He walked in, and after some years the other scientists, Andrew included, walked out. Mansfield records his view: "The result of these moves created a considerable vacuum at Nottingham, but the important thing from my point of view was that all the infighting and intrigue that had gone on over the last there or four years stopped."

The subtitle of the autobiography *The story of magnetic resonance imaging* and long passages of the text are misleading, wrong, nagging, and arrogant. Sir Peter's life story isn't the story of magnetic resonance imaging. When he heard about Lauterbur's invention of MR imaging, he jumped on the bandwagon – but he tries to convince the reader that imaging was really his idea.

Soon afterwards his acumen in acquiring and enforcing patents in his NMR research fields became profitable. With a lot of emphasis on details Mansfield describes his interaction with the university administration, numerous companies, and politicians all the way up to Gordon Brown, at that time junior minister in the opposition, later Labor Party Prime Minister.

Mansfield received a knighthood in 1992, and finally at the end of the long road, he was chosen to share the Nobel Prize in Medicine or Physiology with Paul C. Lauterbur.

In his typical manner, here too he finds a fly in the ointment: "When we read the detail in the information pack of the Nobel Prize Committee, it became apparent that they would only cover the costs of travel to Sweden for me and my wife. A number of other people were eligible to come but at their own cost. I decided that the sensible thing would be to limit the number of guests to our close family, namely my two daughters, their husbands, and the four children."

Usually, prize recipients take their collaborators with them because research is a team effort; the invitation to join the ceremony is an acknowledgement and reward for their contribution to the common goal.
Although he lived abroad for some time, Mansfield remained closely attached to the English class system. The late Duke of Bedford's oeuvre "The Book of Snobs" makes perfect supplementary reading to this autobiography [3].

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What's molecular in molecular imaging?

Peter A. Rinck

PRO ACADEMIA EMRF THE ROUND TABLE FOUNDATION

At the recent 14th Biennial Conference on Contrast-Enhanced Biomedical Imaging in Valencia there was a Round Table Discussion on this topic. Here, I summarize my line of reasoning – polemic as it might be.

"Molecular" is very fashionable adjective: Nowadays you find molecular anthropology, molecular bartending and mixology, molecular biology, molecular sorting – of garbage, that is. Thus, molecular medicine and molecular imaging are not alone. They fit nicely with molecular ecology, molecular urology, molecular histology and molecular pathology – and, they all are at the forefront of science.

Many of these novel disciplines are – more or less – well defined, for instance: "*Molecular gastronomy* is a subdiscipline of food science that seeks to investigate, explain and make practical use of the physical and chemical transformations of ingredients that occur while cooking, as well as the social, artistic and technical components of culinary and gastronomic phenomena in general." [1]

A joint summit of the Radiological Society of North America (RSNA) and the US-American Society of Nuclear Medicine (SNM) some years ago defined *molecular imaging* as "techniques directly or indirectly monitor and record the spatio-temporal distribution of molecular or cellular processes for biochemical, biological, diagnostic, or therapeutic applications." Then, SNM changed its name into SNMMI adding "Molecular Imaging", and created an even longer, all-embracing definition at the same time [2, 3].

"Molecular imaging" might not be molecular imaging at all but cellular imaging – or, simply, a metaphor.

This definition sounds similar to that of molecular gastronomy, but if one reads it with the brain switched on, "molecular imaging" might not be molecular imaging at all but cellular imaging - and it's always four-dimensional, three in space, one in time. Some authors describe it as *in vivo* examination of processes [4], some include *in vitro*. For others it's an *ex vivo* technology, for instance, the application of molecular imaging using mass spectrometry in molecular histology: *Chacun à son goût* – everybody according to his own taste.

The authors of this and similar definitions seem to have realized from the beginning that the term "molecular imaging" walked on crutches. As the American Board of Nuclear Medicine states "exactly what constitutes molecular imaging can be confusing. For example, measurement of myocardial blood flow with radioactive tracers such as Tc-99m sestamibi or tetrofosmin would not be a molecular imaging technique because measurement of blood flow is not a molecular or cellular process." [5] Nor is the measurement of the ejection fraction of the heart. Nor are contrast-enhanced x-ray or MR angiography.

Some people believe that "molecular imaging" means imaging with molecular spatial resolution or mapping the distribution and activity of molecules in living tissues. These are a misguided thoughts too.

In reality, "molecular" is used as a metaphor, a symbol of something else, perhaps an allegory symbolizing the ideas and concepts of great and deep and cutting edge research. However, it doesn't mean "molecular".

Under the molecular umbrella, representatives of different scientific and commercial fields meet and misunderstand each other; the never clearly defined boundaries between science, research, medicine, politics, and commerce have become completely blurred.

And thus, molecular imaging has become the battle field of a turf war. Everybody wants to be a molecular imaging warrior. There is no fight for the contents, rather for the flag with the big MI. Aimed at radiologists, Alexander Margulis wrote a short note in the journal Radiology in 2012, "Molecular imaging – love it or lose it." [4] I suggest: lose it.

The story of the Tower of Babel told in the Book of Genesis of the Bible is a beautiful description of what happened with "molecular imaging", "personalized imaging" and similar terms:

"The whole earth was of one language ... And they said one to another: let us build us a city and a tower, whose top may reach unto heaven ... and the Lord said: 'Behold, the people is one, and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do. Let us go down, and there disarrange their language, that they may not understand one another's speech.'"

The issue is not the lack of ability and practical capacity to perform acts that may reach unto heaven; it is the inability to communicate in an understandable and correct language about it.

The conclusion of the round table discussion was that there are two uses of the term "molecular imaging", one among scientists and one for politicians and bureaucrats. As for the scientists: why not return to "contrast-enhanced biomedical imaging"? If you want, you can add "targeted" for good measure. It is a clean and well-defined term; people know what you are talking about, it's idiot-proof.

As for the distributors of research funds – "molecular imaging" opens the door to the treasures: to them it sounds good and scientific. Or as one well-known participant pointed out: "Molecular imaging is a kind of dead body which is revived when needed, like the dead grandfather is to get the pension money."

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Radiology and medicine – research or science?
Or: Is the science really so good at 'scientific' meetings?

Peter A. Rinck

Every year at the ECR and other congresses, I hear what great science is presented. Frankly, though, there is very little hard science presented at such events but mostly technology and applied research, and they are primarily teaching, social, and commercial gatherings, not strictly scientific meetings.

Science, research, and technology aren't synonyms; and radiology isn't science – nor is medicine.

Often there is a misunderstanding of the term "science," and this lies at the heart of the matter here. *Science* is knowledge of the world of nature – the concerted human effort to understand, or to understand better, the history of the natural world and how it behaves and functions, with observable physical evidence as the basis of that understanding. It is done through observation of natural phenomena and through experimentation that tries to simulate natural processes under controlled conditions.

Research is as old as mankind: gathering of data, information, and facts.

However, contrary to the Latin word *scientia*, science did not originate in ancient times; it developed in its mature form only a few centuries ago. The word *scientia* is the root of the French or English word science, but originally scientia means knowledge: "Scientia potentia est" – "Knowledge is power" was Francis Bacon's maxim [1]. Science and scientia were two completely different terms. The Oxford English Dictionary dates the origin of the word "scientist" to 1834.

Many historians suggest that modern science began around 1600 in the time and with the efforts of, for instance, Galileo Galilei, Johannes Kepler, and Francis Bacon. Their era punctuated the change from the scholasticism of the Middle Ages and Renaissance to science as we know it. Scholasticism largely involved deductive reasoning from principles supplied by Aristotle and the Bible.

Modern science instead involves induction from multiple observations of nature, and so works from basic observation or experiment to generalization. Francis Bacon and René Descartes helped to define science and establish the *scientific method:* "A method or procedure that consists in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses."

Already in the early 19th century, the scientific disciplines were becoming well defined and increasingly separated in their methods and philosophies. Alexander von Humboldt attempted to unite all manner of natural phenomena to understand the heaven and earth, the whole universe. Few others have attempted such a grand undertaking. Throughout the 19th and 20th centuries, scientific disciplines increasingly subdivided into ever smaller and more specialized fragments.

Nowadays we distinguish the following groups of sciences:

- **Natural sciences, (the 'true' or 'hard' sciences)** – the study of the natural world: astronomy, earth sciences, biology, chemistry, and physics,
- **Social sciences, (the soft sciences)** – the systematic study of human behavior and society: sociology, psychology, anthropology, political sciences, and economics, and the
- **Humanities and Liberal Sciences**, those branches of knowledge that are concerned with human thought and culture: philosophy, mathematics, history, literature, and art.

Different countries vary not only in their nationalities, their population, their cultures and attitudes, but also in their languages and in the understanding of terms and terminologies. Science or not-science is a question of academic schools and geographic regions. In contrast to the *scientifique, científico,* or *wissenschaftlich* character of the continental European academies of science, those in England and the United States were scientific in the stricter sense of the word, that is, usually limited to the natural sciences, the hard sciences, and excluding the social sciences and humanities.

Because pride and vanity, money and power – both political and individual – play a major role when it concerns science, everybody wants to be a great scientist, not only a simple researcher.

Medicine is not a science – it's sometimes described as an applied science, sometimes as an art or a craft. The medical Nobel Prize is called "The Nobel Prize in Physiology or Medicine." Physiology is considered a science.

Medicine always stood outside at the edge of science. Taking radiology as an example, Röntgen, a physicist, discovered x-rays in 1895, but he left the field in the year 1900. Lauterbur invented magnetic resonance imaging and many of its applications, but he never personally used the method in medicine. He was a chemist. Röntgen and Lauterbur developed the ideas, engineers turned them into routine technologies. Physicians – among them radiologists – use them. Using x-rays or magnetic resonance imaging doesn't turn the user into a scientist.

However, a physician can be a scientist; a scientist can also be a radiologist. Science today is becoming increasingly complex and diverse – which becomes visible in diagnostic imaging applications. Here the knowledge of physicians can be integrated into overlapping scientific disciplines. Yet, research and science are not synonyms. A phase-3 study of a drug or the addition of yet another eight channels to a CT scanner is no scientific highlight. Still, it can be solid and honest applied research. Why not be a good researcher and knowledgeable radiologist?

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A practical escape to avoid the real topics.
Or: Why all the sudden fuss about ethics?

Peter A. Rinck

Talking about the weather isn't very original. But it's convenient and an easy way out when you meet somebody. It doesn't involve great mental expense nor previous knowledge. Everybody can contribute. It's either too hot or too cold for the season, global warming or global cooling, whatever your convictions are. Earlier one believed in God (or god) only, today the range of beliefs can be fanned out ad infinitum. If you say something wrong you won't be called to account; on the contrary, usually your conversation partner doesn't listen at all.

The same seems to hold for lectures and publications. Hardly anybody pays attention to the details. Few really understand or digest what's told – or not told. Recently my bank sent me their new Code of Conduct, thus indicating that they, from now on, would turn ethical. It's one of the fashions of these times to do so. After what my bank still does to me, I know it's lip service, not legally enforceable.

This March, the European Society of Radiology published a "Code of Ethics" [1]. What is really meant and described is a "Code of Conduct" or "Code of Social Responsibility", as my bank sent me. Not only its printing – light gray letters on a whitish background – but also the contents are misty. Of course, it is difficult to say to some of one's colleagues that they are misbehaving – some of them beyond belief. It is also difficult to find a remedy for aberrations that have settled in for generations and become a general disease.

"I solemnly pledge to consecreate my life to the service of humanity" – not to business.

Ethics or "moral philosophy" is the branch of philosophy that deals with the values of human life in an understandable and systematic manner. It is concerned with the type of conduct or character that is approved or disapproved of – in terms of right or wrong, of good or bad, and meant to help and guide humans to make morally right choices in their daily activities.

The history of ethics is thousands of years old. Today's "Applied Ethics" is divided into numerous fields. I doubt that one can develop a self-contained "Code of Ethics" for a marginal medical discipline like radiology; it belongs to the ethics of ordinary medicine. One could promote overall ethical reflection and conduct in radiological practice and applied research.

However, the transition from patient-focused radiologist to medical business executive represents a hardly solvable ethical problem. As other medical disciplines, parts of radiology today are run on a commercial basis, as a commodity. Medical ethics should apply, but business behavior patterns outside the ideas of the Hippocratic Oath take over.

As for the European Society of Radiology, it would have been better to ask somebody outside the community to draw up an explanation of what ethics really constitute and what ethical behavior in medical imaging means. There is a vast literature about medical ethics, and even for nearly 40 years a Journal of Medical Ethics, covering all features of the topic.

One could start with the Declaration of Geneva, adopted by the General Assembly of the World Medical Association in 1948 – a modified form of the Hippocratic Oath. The original Declaration reads as follows:

"I solemnly pledge myself to consecrate my life to the service of humanity. I will give to my teacher the respect and gratitude which is their due; I will practice my profession with conscience and dignity; the health of my patients will be my first consideration; I will respect the secrets which are confided in me; I will maintain by all means in my power the honor and the noble traditions of the medical profession; my colleagues will be my brothers; I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my

duty and my patient; I will maintain the utmost respect for human life, from the time of conception; even under threat, I will not use my medical knowledge contrary to the laws of humanity. I make these promises solemnly, freely, and upon my honor."

However, the problem is not to write down honeyed lines, but to implement the concepts. The ethical values have been lost and it will hurt many people financially and in their egocentric and arrogant treatment of patients and colleagues to get them back.

At a number of round-table conferences during the last 15 years, we have seen how difficult it is to reach a common understanding of what ethics in medical imaging and medicine at large comprise – and we could not come to a conclusion on how to reintroduce ethical values and behavior in medicine without punishment of the guilty [2].

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Diplomania – or the value of "excellence"

Peter A. Rinck

PRO ACADEMIA EMRF THE ROUND TABLE FOUNDATION

As I mentioned in the short excursion on ethics some weeks ago, the implications of moral philosophy in medicine are a broad field [1]. Among the issues not mentioned, is the doctors' proof of professional skills.

When you enter doctors' offices in certain countries you will find the walls plastered with diplomas and certificates – proof and evidence of the soundness and quality of the doctor's knowledge. This custom becomes increasingly popular in Europe too.

Every time I step into such an office or waiting room, I remember the description of a champagne bottle in the first chapter of Thomas Mann's novel *Confessions of Felix Krull, Confidence Man*.

"My poor father owned the firm of Engelbert Krull, makers of the now discontinued brand of champagne 'Loreley Extra Cuvée'. Its label had been designed by my godfather and bore a number of coats of arms and stars, all in gold letters. Unfortunately it appears that the quality of the wine was not entirely commensurate with the splendor of its coiffure."

Some people believe that quality control has become easier with the arrival of computers and the internet: for instance, hotel evaluations are at your finger tips with websites like TripAdvisor. The site awards its "Certificates of Excellence":

"The Certificate of Excellence award honors hospitality excellence. The accolade is given only to establishments that consistently achieve outstanding traveler reviews on TripAdvisor, and is extended to qualifying businesses worldwide. Approximately 10 percent of accommodations listed on TripAdvisor receive this prestigious award."

Ten percent doesn't sound much, but in absolute numbers it's a lot. There is no costly "peer-review", no reliable verification of the evaluation. The result is a new industry of ghost writers producing everything from horror stories, half-truth reports, subliminal positive and negative descriptions, or five-star hallelujahs. The users have real customers' evaluations and marketing lies at their fingertips – or better mouse clicks. One can't distinguish one from the other.

Repair shops and sales offices of minor and major companies, manufacturers of medical and scientific equipment included, turn into "Centers of Excellence" and on the internet one can obtain certificates for achievements and doctorates for "lifetime experience". The same holds for medical imaging and neighboring disciplines.

The New York Academy of Sciences, for example, is one of the oldest scientific societies in North America. It was founded in 1817, has more than 25,000 members today, and is run like an automobile club. Nearly everybody can apply and become a member. I find it rather amusing when somebody tells me that he is an "Elected Member" of the New York Academy of Sciences since joining the society is – more or less – three mouse clicks and a credit card charge away.

Elsewhere, it has also come into fashion to present or sell "Certificates of Excellence" before excellence has been shown. One even can apply for it. The European Congress of Radiology and the European Society of Radiology (ESR) with its nearly twenty daughter societies have started to display a business flair of their own which may suit such professional societies, but not learned scientific societies. ESR and its daughters mutually endorse each other and arrange "board" examinations - for instance in cardiac radiology, the European Board of Cardiac Radiology (EBCR) Diploma which confirms specific competence of radiologists to perform, interpret and report cardiac CT and MR independently, price between 400 and 600 euros.

It's a fine incentive for young radiologists, as is the diploma of ESOR (European School of Radiology). The European Society of Magnetic Resonance in Medicine and Biology (ESMRMB) issues "Certificates of Excellence" to members – the price of excellence is 200 euros. Showing such a certificate when applying for a new position might turn out counterproductive. Producing hot air might be advantageous in business but not in medicine and science.

Credibility is a volatile quality. It's difficult to acquire, more difficult to keep – and fast destroyed. The change of scientific societies into commercial organizations is an unpleasant side effect of outsourcing their administration and the organization of their events and conferences. It is a lingering process moving from academia and medicine into business, stretching over decades. It usually, though not necessarily, leads to a decline of reputation.

Credibility is a volatile quality. It' is difficult to acquire, more difficult to keep – and fast destroyed.

ESR and ECR are trying to represent European radiologists as a professional society. This would require independence of commercial and group interests, a solid base in the craft of radiology, a background in scientific development, transparent finances – and last but not least credibility.

There is a difference between a certification of attendance – which today is a necessity to get CME credits – and a certificate of excellence, which signifies a competent and qualified statement by a senior academic of higher-than-average scientific achievements in a research field. This new business model meets with criticism and disapproval. Rightly so, university presidents and faculty deans complain that certain certificates and diplomas issued by professional associations are just empty shells and undermine controllably acquired knowledge and degrees. It also sheds a strange light upon the quality of certain learned societies and definitely on professional societies.

On the other hand, universities have heavily contributed to the scientific and educational decline in the sciences and in the dilution of formerly clear terms such as "excellence", "distinction", "high quality", "merit" ... listening to the chant of politicians declaring overnight certain universities or colleges "elite institutions" is excusable. Believing, however, such declarations is a sign of naivety or asininity. One doesn't become good and famous overnight and certifications are useless if one agrees on low standards. Close ties between universities, the major funding institutions and the political caste can easily undermine the stability of education and research.

More content, less wrapping!

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The copy-and-paste generation: Plagiarism's many faces

Peter A. Rinck

Plagiarism in science and research publications is widespread. It's not directly connected to the standard of a dissertation or a scientific article, but authors and institutions that are scientifically not very demanding, and prone to deliver poor work, usually take the decisive step to plagiarism faster.

Some months ago I had to rate a 50-page review paper. The authors had copied half sentences, full sentences, even complete paragraphs from references. The sentences were pasted together without fitting verbs; some new sentences came from different scientific publications and did not fit together; there were contradictions within one paragraph. What do you do with such a paper? How dare the authors submit such junk and believe they can get away with it?

Many members of the "copy-and-paste" generation seem not to be aware that plagiarism is a striking lack of scientific competence. It is not necessarily their fault; often neither their teachers nor their supervisors have introduced them to the principles and rules of scientific work and publications. Thus, they don't understand the need for accurate work and the generally accepted standards to prepare papers.

Plagiarism is a striking lack of scientific competence.

Two years ago I wrote about the plagiarism scandals all over Europe, most of them involving politicians and other people in the limelight [1]. They mainly involved doctoral theses in countries where a doctor's title is important for the social, professional, and financial status of a person. In Germany, two government ministers were forced to step down, and in other European countries, North America, and Asia, plagiarism also took its toll.

Plagiarism and copyright infringement are closely connected and increasing due to the ease of copy-and-paste. Plagiarism means taking someone else's work or ideas and passing them off as one's own; the crime is fraud. Copyright infringement is theft. It refers to the unauthorized use of copyrighted material. "Copy-and-paste" is the modern tool to perform these crimes.

Universities and other institutions of education are one place where this regularly occurs; the other side of the coin is the highly commercial plagiarism and copyright infringement of multinational internet companies. Pirate websites like Google Book open straight and easy access to published books and magazines without paying the authors or other copyright holders any royalties.

Children and adults are not taught any more that property is a value, including intellectual property. They don't know or understand that this is one of the concepts our societies are based upon, but ask: Is plagiarism really so bad – even criminal? Google's and Amazon's lobbyists say: No, it isn't. They and many others continue bootlegging.

What is worse: shoplifting or plagiarism ... or is it a gentleman's crime? What's the damage caused by plagiarism? This includes financial damage, but also damage to the scientific and educational system – because plagiarists are not able to produce research and results on their own.

In science, plagiarists very often also damage themselves because they are found out sooner or later; their reputations, and the reputation of their groups and departments, are tainted.

Scientists or any other authors work hard to create their results, write them down, and publish them. The process is a result of their ingenuity, talent, and stamina. Copyright exists to protect these people and to give them financial and career support.

All faces of plagiarism and copyright theft are unacceptable; what belongs to you is not mine. Strangely, though, at some point "Googlism" even meets socialism: "Plagiarism saves time and effort, improves re-

sults, and shows considerable initiative on the part of the plagiarist. As a revolutionary tool it is ideally suited to the needs of the late twentieth-century [2]".

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US-healthcare – the price of it all

Peter A. Rinck

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It's always a painful sensation when one realizes that a service or a product one pays for is overpriced and of inferior quality. At times I am asked to give a second opinion about imaging examinations, mostly magnetic resonance studies made in private offices in the US. It's usually patients from Latin America who traveled to the US because they believe that the health system in Miami, New York or Chicago is better than in their home country. Many among them would be aptly and correctly served at home by well trained radiologists, even better than in the US.

Usually the quality of the studies I see is sufficient to make a diagnosis, but in a number of cases there is no reason to be proud of the radiological work. Equipment maintenance is not written with a capital M and image artifacts are common – it seems that the more expensive the apparatus is the more artifacts you get.

Sometimes one also wonders whether there is enough competence, experience and professional integrity to choose certain kinds of studies, and to perform and evaluate them. However, it's not my business to discuss this with a patient or colleague who just wants my opinion concerning a certain study and diagnosis.

Often I am told what the patients were charged for their studies. Again, I don't comment on the prices although sometimes I have to swallow hard. I got a health insurance that covers treatment all over Europe and the rest of the world. It is not cheap. The US is the only country that is explicitly excluded: for the US one needs an additional insurance – some insurance brokers even suggest air-evacuation back to Europe in non-life threatening situations: because of the cost. There is a chasm between the US and the rest of the developed world that cannot be explained by the standard of medicine. There are more than enough studies underlining that US-Americans do not get better health care than patients elsewhere.

Nearly twenty years ago I wrote in one of my columns: "Two terms are important: 'patient-driven', which means that the patient must be the center of medical thinking; and 'outcomes' because that is what is important for the patient. To many administrators, politicians, radiologists and industries, patient outcomes are secondary. We hardly know anything about the outcomes of what we are doing in diagnostics and therapy." [1]

This has not changed. Even worse, today the US spends 20 percent of its gross domestic product (GDP) – an estimated US$ 2.7 trillion for 2013 – on health care. In the column I mentioned above I referred to the status in 1990: at that time the expenditure was 10.7% of the GDP. In the meantime it nearly doubled.

Hospitals, drug companies, device makers, physicians and other providers can benefit by charging inflated prices.

Earlier this year, there were several long and alarming articles about this problem in Time Magazine and in the New York Times [2-5].

As Elisabeth Rosenthal in one of her three articles in the New York Times stated:

"[US] Americans pay, on average, about four times as much for a hip replacement as patients in Switzerland or France and more than three times as much for a Cesarean section as those in New Zealand or Britain. The average price for Nasonex, a common nasal spray for allergies, is $108 in the United States compared with $21 in Spain. The costs of hospital stays here are about triple those in other developed countries." [3]

and:

"Hospitals, drug companies, device makers, physicians and other providers can benefit by charging inflated prices, favoring the most costly treatment options and curbing competition that could give patients more, and cheaper, choices. And almost every interaction can be an opportunity to send multiple, often opaque bills with long lists of charges: $100 for the ice pack applied for 10 minutes after a physical therapy session, or $30,000 for the artificial joint implanted in surgery." [3]

The trend in Europe is similar, medicine turns into a for-profit market segment - radiology being at the forefront, but not the leader.

As a potential patient, I have nothing against paying a fee to fellow physicians, also covering the salaries of their assistants and secretaries. However, I object to feeding un- or even counterproductive bureaucratic parasites in hospital administration, state health administration, in a grotesque 'health' industry and – above all – insurance companies and banks. Increasingly and without pity, they bleed sick and helpless people dry – bye, bye Hippocratic oath; what's left is business and self-interest. And – why do US health outcomes lag other countries?

As a physician I add: Why should I fatten an overblown administration with my work – why should a single medical doctor work to support a pernicious pack of pencil pushers and con men?

The health system in many European countries is better, but for how long? For the U.S., neither Steven Brill in Time Magazine nor Elisabeth Rosenthal in the New York Times offered a solution to this problem. I guess they know why. Personally, I have never been in favor of a state health system, but what the U.S. needs is a state-regulated system with state-set (low) reimbursement ceilings for medical services, a separation of physicians from the health management and insurance business, and a nationwide obligatory health insurance for all. In other words, a revolution that would change the entire social structure of the United States of America.

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Personalized EU Funding
Or: What should we make of the personalized medicine bandwagon?

Peter A. Rinck

The aftermath of the 1968 student revolution had the unexpected consequence of bringing university science to almost a standstill. Endless meetings perverted and marred by irrelevant topics and pointless monologues and exchanges became the prevailing culture. In many European countries this problem has not been overcome yet – nearly fifty years later. The same kind of behavior is also inseparably bound up with political or administrative procedures – exercised *ad nauseam* in the meeting rooms of Brussels. It holds for every situation of life, any category of administrative business, any brand of tasks.

"Personalized medicine" [1, 2] is a new catchword in town and one of the latest Union worries; and with it the stakeholders' pilgrimage to the hot springs of money and restaurants of the city has begun.

A "stakeholder" used to be a person who keeps the money of bettors and then gives it to the winner of the bet; legally put: a third party who temporarily holds money or property while its owner is still being determined. In European Union newspeak, stakeholders are people, institutions, or commercial companies wanting money from the coffers of Brussels because they believe they can get it.

In this anonymous world of "stakeholders", the idea of personalized medicine sounds strange. Brussels in many instances resembles Franz Kafka's "The Castle" governed and run by a dark and secretive bureaucracy; and the obvious thread throughout Brussels' permanent new programs and ideas mirrors the men in the novel: bureaucracy made to last forever.

Medicine and healthcare are often used as synonyms, equivalent terms for the same activity. For me, it was interesting that some commercial people seem to understand and make a clear difference between healthcare and medicine: Medicine is performed by physicians, whereas healthcare is the commercialization of medicine, performed by businessmen and bureaucrats. Once again, it is a question of semantics if one wants to understand the motives and considerations of the people involved. Medicine has always focused on a patient, an individual. Healthcare is group-oriented administration.

Medicine is performed by physicians; healthcare is the commercialization of medicine, performed by businessmen and bureaucrats.

According to the press release, the president of the ESR, Professor Guy Frija, emphasized "that in a time of constrained health budgets, demographic change and ever increasing medical treatment options the way to achieve the personalization of medical care is through collaboration between policy makers, medical professionals, patients and industry." He seems to understand the difference between medicine and healthcare. I hope that this was not a slip of the tongue. We have had personalized medicine for centuries. What we need is personalized healthcare, not commercial shareholder/stakeholder gains and interests.

The press release continued with this paragraph: "The chairman of the ESR Working Group on Personalized Medicine, Prof. Aad van der Lugt, and ESR expert Dr. Laure Fournier explained the crucial role medical imaging plays in personalized medicine, from customized screening procedures for cancer tumors to collecting vast amounts of data through population screening and correlating them with 'omics' data. For the ESR, the main issues are increasing the number of cohort studies with imaging, the creation of a European platform of imaging biobanks and ensuring standardization and validation of imaging biomarkers."

I am all in favor of defending or building up a strong position for radiology but here the platitudes chase

each other. It's not science, it's not research – it's data collection, pencil-pushers' and stakeholders' pie in the sky. De-humanization and data centricity do not really overlap with a term like "personalized medicine." It smells of another attempt to create a big bazaar which will waste time, money – and stimulate political infights.

Screening, data collection, and standardization are far away from personalized, individual medicine. It's group-oriented civil-servants' healthcare. It might be useful and lead to more epidemiological knowledge, but it's definitely not the most efficient way of helping individual patients. This is the approach of the NSA to combat terrorism – collecting data that cannot be correlated and that nobody understands, today's leading model of self-importance of an uncontrolable dangerous bureaucracy.

Proposing this path to personalized medicine is fairly comical (another 'omics'?) and the justification amazing. I have written about the Brussels Approach to science and medicine earlier [3]. More so, what many people, tax-paying patients and physicians alike, find difficult to endure is being permanently ridiculed.

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