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## **Weltfremd is of no value to your patients**

Peter A. Rinck



**S**ome days ago a fellow radiologist brought to my attention an article hidden at the end of a recent issue of *Radiology* [1]. She considered the paper *weltfremd*, which is one of those German words that are difficult to translate. The closest interpretation is “out of touch with reality” or, in the case of science, “from the ivory tower.”

During the past 30 years, I have (in most cases anonymously) peer-reviewed countless articles for a wide range of medical journals and written reviews on scientific books. But I never thought I would sit down and draw up a review on an already published article in one of the major radiological journals.

The title of the article is “Globalization of P4 Medicine,” with “medicine” and “medical care” being freely replaceable terms for “radiology.” The article is a summary of a symposium on strategic studies in radiology; a blend of ideas by several authors who presented at that meeting in 2009. The authors are from various European and North American countries with different cultures of radiology, though all of them are high-level academics.

■ The four P's in the title stand for “predictive, personalized, preemptive, and participatory” – all of it on a global level. They “derive from new directions in medical science largely based on genetics, renewed recognition of the medical and financial benefits of maintaining wellness, and heightened recognition of the importance of tailoring care to the unique characteristics of individuals, while expecting them to participate in their own medical care. With modern means of communication and the sharing of medical knowledge, expectations are rising around the world,” the authors wrote. “We can anticipate that P4 medicine will have profound effects on the delivery of healthcare globally, and will transform the practice of radiology.”

This is how the paper begins. Then we read page after page of descriptions of what was, and what will be, interspersed with sentences such as: “However, only a few hospitals have taken full advantage of these technologies,” or: “However, the adoption of imaging to screen for Alzheimer's disease will not

serve a useful purpose until more effective therapies are established.”

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### **What I expect from a paper that is meant to be pivotal in proposing radiology strategies is critical assessment of the state of the art.**

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What I expect from a paper that is meant to be pivotal in proposing radiology strategies is critical assessment of the state of the art, not the common soft statements on the helplessness of radiology in screening, combined with wishful thinking that the future may be bright.

“Many predictive imaging techniques are far from the stage of clinical implementation,” the authors noted. But what the working radiologist out there really wants is serious and solid proposals for the future. Basically, most of the key concepts that are proposed are outside the realm of medical imaging, and definitely outside of radiology.

The discourse is diametrically opposed to the daily reality of radiology, and predicts no future for clinical radiologists – unless they are system biologists, genetic engineers, or molecular scientists. If this is radiology's contribution to the transformation of healthcare, we should urgently look for a new class of image readers who are not called radiologists any more, but who do the job, such as image-reading and radiological-intervention professionals. There might be a new medical discipline covering the fields described in the paper, but it won't be diagnostic imaging. How can we anticipate future health problems if we cannot handle today's?

■ Every so often the paper takes on state administrations' or international organizations' manner of speaking: “Enhancing the culture of professionalism and increasing patient focus will also help avoid the negative aspect of commoditization of radiology, which could lead to lowering of standards in return for a lower prize.”

It's neither easy reading nor easily understandable, and definitely not original research, as Radiology claims. The list of references contains numerous noncitable or untraceable papers. Where is the strategy? Where are the suggestions and answers we are waiting for? Why wellness and not health?

For me, personalized radiology (abbreviated PR) stands for public relations: talking to the patient, bringing the human aspect back into radiology, and being a physician – not the extended arm of a machine. Great leaps forward are usually simple, as are many great achievements. Let's follow that flag – globally.

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## Handle with care: The radiation debate

Peter A. Rinck



**T**here is an ever returning topic in radiology – radiation risks. I commented on it, and summarized some main factors and scientific contributions years ago [1]. Meanwhile, more progress in radiation protection has been made. On the other hand, anything between 16- and 128-slice CT scanners get pushed into radiology departments and private practices, waiting and wanting to be used to irradiate patients (as well as technicians and physicians).

There are red stickers on the wooden crates when they are delivered: “Handle with care.”

■ A diagnostic workup for a wide range of indications by CT was discussed in lectures at this year's European Congress of Radiology (ECR) - and promised to be the most cost-effective technique, superior to other protocols. Not all speakers mentioned possible side effects, some did.

At a Special Focus Session, Dr. Reto Meuli from the University Hospital in Lausanne, Switzerland, talked about “Brain perfusion made easy: CT/MR?” and stressed: “For the CT methods, concern regarding x-ray doses delivered to the patients needs to be addressed.”

A recently published study from Montreal addresses what these concerns are [2]. The authors went through a group of 82,861 patients who suffered from acute myocardial infarction between 1996 and 2006. Seventy-seven percent underwent at least one cardiac diagnostic imaging or therapeutic procedure involving low-dose ionizing radiation in the first year after their cardiac accident. Over a mean follow-up period of five years, 12,020 patients were diagnosed with cancer. The authors showed a dose-dependent relation between exposure to radiation from cardiac procedures and subsequent risk of cancer. For every 10 mSv of low-dose ionizing radiation, there was a 3% increase in the risk of sex- and age-adjusted cancer. Two-thirds of these cancers occurred in the abdomen, pelvis, or thorax.

“These results call into question whether our current enthusiasm for imaging and therapeutic procedures

after acute myocardial infarction should be tempered,” the authors concluded.

By the way, they said the level of exposure to radiation was higher in patients treated by a cardiologist as opposed to a general practitioner.

**“The level of exposure to radiation was higher in patients treated by a cardiologist as opposed to a general practitioner.”**

A second paper goes hand-in-hand with the Canadian results. Researchers from Berlin compared cardiac 64-slice CT and 32-channel MRI angiography at 3.0-tesla in 110 patients, using conventional coronary angiography as the gold standard. The results in both CT and MRI were similar. The Berlin researchers concluded: “However, CT angiography shows a trend toward higher diagnostic performance.”

Performance is not everything, in particular if performance might be deadly.

■ In a former column, I referred to an article published in the New England Journal of Medicine. The paper discussed the growth in the use of CT and the increase in patient radiation exposure. It claimed CT scanning could be responsible for as many as 2% of all cancers diagnosed in the U.S. over the next 20 to 30 years [3,4,5].

Perhaps the red stickers from the delivery crates should be reglued directly on the CT equipment: “Handle with care.”

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## The Guttenberg snippets

Peter A. Rinck



I got a new hobby. Instead of playing solitaire on my computer, I type in, or copy and paste, fragments of my old scientific papers to check who has propagated my writings under his name – or perhaps hers. I didn't turn to any specially developed software, but simply to the advanced search on Google.

Some of the results are flabbergasting. I've had a lot of fun finding out who has used and abused ten- or 20-year-old articles of mine in learned journals. The academic – or, rather, para-academic – life at some universities is thriving: why plagiarize sentences if you can plagiarize entire paragraphs?

After several days I experimented with former magazine columns. This time it was not sentences or paragraphs – I found whole articles reprinted by esoteric bloggers, scientific societies, and greedy publishers. I uncovered them in journals of psychiatry and laboratory medicine, even in a magazine for general practitioners. When I approached the publisher of some of these journals, I was told it was the fault of their computers and software; or in other words: "It wasn't me who shot the man, it was my gun." Suing them is useless, they are too slippery.

In my columns in "not-so-learned" journals, or on the web, I try to paraphrase ideas or arguments I have heard or read, but whose author I cannot remember. Otherwise I cite with quotations marks at the beginning and at the end of the sentence. Editors don't like columns with references, but I like my columns like that.

■ The recent *cause célèbre* in plagiarism catapulted the German minister of defense out of his office. Karl-Theodor von und zu Guttenberg was forced to resign after it surfaced that he had copied major parts of his PhD thesis from other publications, not even changing verbs or using synonyms – and he left the spelling mistakes. Many people see him as a political victim, whereas I really appreciate the scandal. He sold honesty and decency as part of his political program and should have set a good example; instead, the people made an example of him.

Perhaps his – most likely preliminary – demise will help to clean up universities to a certain extent.

### Plagiarism is theft and academically not acceptable.

Plagiarism is theft and academically not acceptable. In many western countries, copying entire paragraphs, articles, or books is a criminal offense: copyright infringement. Yet, who cares if a nobody steals somebody else's intellectual work?

This time, however, it was Baron von und zu Guttenberg, the pretender to the chancellorship of the Federal Republic of Germany. You will find a nice summary of the case in a New York Times article [1]. This article also explains why booking a flight on Lufthansa is time consuming: When giving your name, you not only have to declare whether you are simply Herr or Frau, Mr. or Mrs., but also whether you are Mr. or Mrs. Dr., Mr. or Mrs. Prof., or Mr. or Mrs. Prof. Dr. – I am used to Lufthansa's extravaganzas and always found it entertaining. I change titles according to my prevailing mood. In case I had to book for someone else, I usually turned them into professors.

Against this background, we have to see the baron's case of plagiarism in a social context. However, it doesn't excuse that he has hidden several hundred unquoted citations in his 475-page thesis for a doctorate in law.

■ Once, when my former boss, Paul C. Lauterbur, returned to New York from a visit to Austria, I asked him whom he had met in Vienna. He responded. "I don't really know. I was introduced to a long row of dignitaries: 'Dr. Wiener Schnitzel,' 'Dr. Wiener Schnitzel,' 'Dr. Wiener Schnitzel,' 'Dr. Wiener Schnitzel,' and 'Prof. Dr. Wiener Schnitzel.'" At that time I found the story simply funny, today I have realized its importance and see it describing part of the culture and the social life in certain countries. As Europeans in general smile about men wearing cowboy

hats in downtown Tucson, Ariz., Spaniards, Swedes, and Brits find the German and Austrian run for academic titles (not degrees!) funny.

For a number of professions a doctor title is a social necessity in these and other countries of the region. The scientific background of such a doctorate has been lost a long time ago. It's not proof of scientific and research capabilities. Content, in many instances, is of minor importance. Plagiarism is a minor sin.

A Scandinavian *Dr. Med.* is a real scientific medical degree with several years of dedicated work behind it, whereas a German or Austrian "Dr. med." or any other doctor title is in 90% of all cases "doorplate" or "letterhead" research, according to Ulrike Beisiegel, president of the scientific commission of the German Council of Science and Humanities, an advisory body to the German government. A German doctorate in medicine equals a master thesis elsewhere [2].

Handing out the Dr. med., or a similar title, in law or another soft science without great para-scientific ado after the final university examination would solve the problem; and people with a Dr. scient. med. or similar easily distinguishable scientific degree would be recognizable as someone with a truly scientific background – and commonly lower salary. Nobody would lose face.

It's easy to copy and paste from the net. But it's also easy to copy and detect on the net. In other words: The net strikes back.

■ Plagiarism is a topic to fill an encyclopedia. I'll write about it again soon – about plagiarism in scientific papers.

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## Rude awakening: Will radiographers eventually take over?

Peter A. Rinck



One of the topics at the European Congress of Radiology in Vienna earlier this year was carefully kept under wraps: the decision of a major Dutch hospital's department of radiology to train some of its radiographers to read images. It was not discussed on the stage, but rather in the corridors and at the coffee tables. The overall initial response seemed positive: why shouldn't a well-trained radiographer be competent to read certain imaging studies, for instance in emergency rooms?

The move in the Netherlands follows similar concepts in Great Britain and Scandinavia but goes well beyond the existing "red dot system" under which radiographers check the images of a patient and place a red dot on any image where they see or suspect an abnormality, mostly at emergency units or casualty departments [1]. This established role of technicians is now being extended into one of "reading radiographers".

In the United States "Registered Radiologist Assistants" are already allowed to perform selected radiology examinations and procedures after a special training and examination. They may be responsible for evaluating image quality and making initial image observations. However, the supervising radiologist remains responsible for providing a final written report, an interpretation, or a diagnosis. Could this be a way around further turf wars and into strengthening radiology – or will it create new turf wars [2, 3]?

The annual salary of such a radiologist assistant is about 72,000 euros similar to a board-certified hospital-based radiologist in Germany or two thirds of the salary of a radiologist in Norway.

■ What are the reasons for this and similar developments elsewhere?

There are not enough trained radiologists to read all the pictures produced today. The number of x-rays, CT and MR images, ultrasound examinations and others have exploded, not only the number of studies

but also images per study. Teleradiology and computer assisted radiology were going to be the way out. But there is still overproduction, the daily heaps are growing into mountains.

It would be better to cut down on unnecessary examinations and focus upon the meaningful use of imaging studies. And this has to happen in the foreseeable future. We don't need bigger storage spaces on the computers, but a rational limitation of the overproduction. We need referring physicians and radiologists to understand the advantage of thinking (with their own brains) and to critically assess the ever increasing workload.

We also have to take into account legal and ethical aspects. For instance who will be responsible for the contents of the final radiological reports?

■ One should also think twice about what kind of consequences such a solution will have. Will we create "bare-foot" radiologists? Some patients and doctors will think that radiology delivers now inferior services, not provided by professionals but by paramedics, and they might say: "Radiologists are easily replaceable." To play with fire means to court disaster. Does the end justify the means?

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**It's the typical political and administrative approach of our times – leveling downwards, by management of the consequences, but not by solving the causes.**

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You don't heal a growing cancer with aspirin or even morphine, even if the patient might feel better for some hours or days. You have to grab the problem by the roots. You might get through the heap of images with the help of radiographers, no doubt.

However, this won't solve the problem. It's the typical political and administrative approach of our

times - leveling downwards, by management of the consequences, but not by solving the causes. Guidance from a high chair is easy, being constructive, creating more positions for highly trained (and well paid) professionals and fighting extravagant waste medicine for the monetary benefit of parasites require real women (and men).

What will happen when new positions for specially trained technologists are introduced everywhere? There will be a new class of image readers who are in between radiologists and "simple" technicians. They will be upper-class technicians, looking down on their former comrades in arms. Envy, malevolence, and bickering will move into the departments, the atmosphere will be tense - as it was some time ago when the radiographers fought against the radiology nurses who did not have the technical training they had.

You tell me that this is no argument? Wait and see and live with it. Psychology is part of the job. Today you don't find radiologists, and it is often even more difficult to find department heads to fight off the bureaucrats; in some places you already have technicians as department heads because no radiologist wants to take that job - with (in politically correct lingo) interesting results.

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# Everybody suffers from publishers' thirst for quick profits

Peter A. Rinck



People don't seem to write papers any more, but rather blogs or other on-line publications. Even "learned" papers (scientific articles) rarely appear as hard copies in glossy journals, but as soft copies on the World Wide Web. The number of such articles seems to increase and the quality to decrease. Most likely, the number of true readers decreases too. A good learned article used to be at least five pages long. My earlier printed columns were one and a half or two pages, but my blogs are 500 words or two typed pages, double spaced.

The reason is the limited attention span of readers – including me. The brains are filled. Information (or what is considered information) is abundant. Twittering tweets, defined as "short bursts of inconsequential information [1]," finally seem to close the gap to the Neanderthal.

Important information drowns in the sea of infotainment, and facts are mixed with opinions, fabrications, and commercials. Formerly respectable and trustworthy scientific publishers have jumped on the bandwagon of mass-produced "scientific results" and churn out ever-so-many new, but not novel scientific magazines, first printed, nowadays on-line.

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**Some of my best friends are publishers.  
But whenever they complain, I know I  
hear the authentic voice of self-interest.**

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I have nothing against publishers. Some of my best friends are publishers. But whenever they complain, I know I hear the authentic voice of self-interest. They are part of the huge apparatus making money from the work and the financial input of other people and institutions. As always in business, the middlemen gain, not the producers, in this case the authors [2]. I am willing to pay for quality and service. However, I am not interested in "scientific" articles, openly or covertly sponsored and placed by commercial interests.

■ Journals on the internet were going to be the way out. There would be no more printed copies and no more archiving of tons of volumes in libraries. The environment would be protected, and entire forests would grow into jungles where birds would sing and hedgehogs would have a happy life. Submitted articles would be available on-line within weeks of submission, and they would be easily accessible. They wouldn't have to be printed and the journal wouldn't have to be mailed to the readers and institutions that have a subscription. Authors wouldn't have to wait a year or more for publication.

Reality is sobering. A vast chaos of computer-aided publishing has been created, and while some journals have succeeded in producing their issues and volumes reliably on the Internet, many of the major publishers oversee a disastrous mess. The submission and review process is cumbersome, and authors still wait a year or more for the publication of their articles.

I also wonder whether the big (and the small) publishers have taken into account the resulting costs of publishing everything on the net, without hard copies in the libraries. They will be prohibitive in, say, 10 or 20 years, because all data must be backed up permanently so that it's not lost. Considering today's incompetence at the major publishing houses and their greed for fast and easy money, I am sure that nobody has thought about it. Après nous, le déluge; they don't want to face it, because this process is not manageable, nor is it calculable.

Publishers will try to transfer the burden on to libraries or, if possible, the tax payer: "Saving and caring for the heritage of mankind ..."

Meanwhile, potential readers of scientific articles are forced to pay anything between 25 and 50 euros (\$35 to \$70 U.S.) per copy. One of the ways out of the dilemma is to return to the olden days of reprints. Years ago, we used to send a postcard to the author and ask for a reprint, and the authors would send you a copy by return mail. Today it's easier: Send an e-

mail to the author and ask for a reprint. PDF files are fast and efficient, and one keeps a personal contact – and even if the publisher has forced the author to transfer the copyright to them, it's a legal transaction because it's for private use.

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## Why 'feminization' of radiology is good news for patients

Peter A. Rinck



**M**edicine has a long history as a stomping ground for men, radiology being one of the salient disciplines. However, according to the Organization of Economic Cooperation and Development, women today make up 54% of physicians younger than age 35 in the U.S., 58% in France, and 64% in Spain [1].

In 2009, women constituted only 27% of practicing radiologists in the USA [2], but looking at radiologists in training, women came up to 80% in Latvia, Estonia, and Belarus; more than 60% in other East and Southeast European countries; 60% in France, Croatia, Portugal, Denmark, Spain, Ireland, and Hungary; and in the 50% range in Belgium, Austria, Sweden, Finland, and Poland. The U.K., Germany, the Netherlands, and Albania still had more male than female radiologists in training [3]. However, also in these countries the trend is going up and women will surpass men soon.

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### Soon female doctors will surpass men in radiology.

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Let's have a short look into the future at the European Congress of Radiology (ECR) in 2020: At the Grand Opening Session, the president of the congress, Maria Theresia Rubens, congratulates the ex-president, Jules Bocusse from France, for his contributions to French radiology and cuisine, and hints that he is not only intelligent but also rather handsome. At the end of her introductory talk, she suggests all women stand up and give a round of applause for him and men in radiology – those few men left in the field.

Is this appropriate and acceptable behavior? Not in my book. Could it happen? It's rather unlikely. Has it happened? Yes, though the other way around. There was much rolling of eyes when this occurred at the ECR 2011 in Vienna.

The suggestion that all men stand up and give a round of applause for a female award recipient and

women in radiology in general did not go down smoothly with the women in the audience.

Official European or global radiology speeches at the ECR easily turn into eulogies of national radiological societies, some locally well-known radiologists – mostly elderly men – and a list of tourist attractions and pictures of young women in "typical" traditional costumes.

■ Earlier this year, the New York Times had several contributions on the Female Factor, examining where women stand in the early 21st century. In an article about women in medicine, the author asked the following:

Will the feminization of medicine lead to losses in income and status? Will countries need to train and pay for more doctors to make up for maternity leaves, part-time schedules, and job sharing, which are often sought by female doctors trying to balance work with their personal lives?

Women in medicine are usually dedicated and have no problems working long days. In addition, they are more cautious and avoid unnecessary risks. They also seek help and discuss issues with their colleagues; they seem to be less anxious than men to lose face.

Yes, there will be maternity leaves and job sharing; however, if a department is well organized, such fluctuations are easily (and happily) adjusted to. All it takes is a grain of good will.

By the way, German researchers also detected signs of a female factor in treatment. A 2008 study in the Journal of Internal Medicine found that patients with type 2 diabetes responded better under the care of women, showing more improvement in blood pressure and cholesterol counts and taking their medicine doses. The researchers said female doctors were more likely to communicate well and involve patients in their own care [4].

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## The jury's still out on airport body scanners

Peter A. Rinck



**A** year ago, I wrote an article about airport body scanners and the controversy around them [1]. Apparently, some people thought this to be an authoritative text; shortly after its publication, the following lines appeared in Wikipedia's section on airport security with a link to the article:

"There are misunderstandings about how x-ray backscatter scanners function, but they do use ionizing radiation and the x-rays emitted from them penetrate clothing as well as skin. While the risk of cancer from a single backscatter check is probably low, the cumulative risk of repeated exposure to radiation is a threat to public health, especially for people working in the airline industry and frequent travelers."

After some months, this paragraph disappeared; I have no idea who had written it nor who had purged it. Was it ignorance, politics, or business interests?

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### **Users should be aware that Wikipedia might be a flawed and unreliable research tool.**

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However, the discussion about side effects of x-ray backscatter scanners is far from finished. At the beginning of June, the U.K. Royal College of Radiologists (RCR) and the British Institute of Radiology (BIR) published a report on the topic, stating that "airport body scanners are safe, and the public should be informed and reassured regarding their use." [2]

■ In a press release, Dr. Peter Riley, consultant radiologist and chair of the BIR's Radiation Protection Committee, pointed out: "All available data suggest that the radiation doses for air travelers and aircrew from airport scanners are tiny. Such doses are only a small fraction of the exposure those same travelers will receive from cosmic radiation as they fly at 30,000 feet. In medicine, the small risk to health from diagnostic doses of radiation is offset by the quantifiable benefits of early diagnosis and treatment; in the airport context, the benefit is one of higher travel security."

This is old news, coupled with unproven hypotheses, and in general, the authors lack lateral thinking. Many people will now think that radiation in small doses is not dangerous, it can be used elsewhere too – and bureaucrats and politicians will decide what consists of a small dose.

As for higher travel security, wishful thinking gives added peace of mind, but there is no proof that the intensified airport controls have any positive outcome.

■ In the same release, Dr. Tony Nicholson, dean of the RCR's Faculty of Clinical Radiology, added: "Both passengers, and airport and airline workers, have the right to be informed about the levels of radiation they are exposed to. However, they should be reassured that these levels are very low indeed, and are well regulated in the U.K., being subject to the Ionising Radiation Regulations 1999, enforced by the Health and Safety Executive."

Usually, I have no keen interest in reading texts of laws and regulations, but I looked for the mentioned British Ionising Radiation Regulations concerning all employees working with x-rays, which includes all airport security personnel, and found, for instance:

"The employer shall ensure that a health record, containing the particulars referred to in Schedule 7, in respect of each of his employees to whom this regulation relates is made and maintained and that that record or a copy thereof is kept until the person to whom the record relates has or would have attained the age of 75 years but in any event for at least 50 years from the date of the last entry made in it."

I doubt anybody will follow these regulations, definitely not the security companies in charge of airport controls.

■ Two articles published in Radiology this spring paint a more balanced picture. David A. Schauer, executive director of the U.S. National Council on Radiation Protection and Measurements (NCRP), wrote:

"The summation of trivial average risks over large populations or time periods into a single value produces a distorted image of risk, completely out of perspective with risks accepted every day, both voluntarily and involuntarily." [3]

In the same issue of *Radiology*, David J. Brenner of the Center for Radiological Research at Columbia University noted: "From a public health policy perspective, given that up to 1 billion such scans per year are now possible in the United States, we should have concerns about the long-term consequences of an extremely large number of people all being exposed to a likely extremely small radiation-induced cancer risk – in particular given that there are current practical alternatives that do not involve ionizing radiation [4]."

"If there were no feasible alternatives to x-ray backscatter scanners, it could certainly be argued that such population risks would be more than balanced by the associated benefits of reducing the risk of a terrorist event," Brenner added. "However, millimeter-wave scanning is a feasible and practical whole-body scanning technology that does not involve ionizing radiation and for which there is currently essentially no mechanistic or experimental evidence of biologic risks. Whatever the actual radiation risks associated with x-ray backscatter machines, the ALARA [as low as reasonably achievable] principle clearly implies that a comparable technology that does not involve x-rays is a preferable alternative."

In his paper, Schauer reasoned: "The public needs answers to the following questions: (a) What are the threats and how does backscatter x-ray imaging of people reduce these threats (i.e., is the benefit greater than the risk)? (b) Has radiologic protection been optimized (i.e., are doses as low as reasonably achievable, taking into account economic and societal factors)? (c) Is there documentation to demonstrate compliance with the annual administrative control of a 0.25-mSv effective dose for a member of the public that NCRP [National Council on Radiation Protection] commentary 16 recommends for individuals undergoing security screening procedures with x-ray scanning devices?"

Schauer also noted that the answers are available, but there is a hitch. "The risk assessment in the Aviation Domain Risk Assessment or any superseding reports would be the logical place to look for answers," he wrote. "The Transportation Sector Security Risk Assessment (TSSRA) is sensitive security information,

and the results of the Risk Management Assessment Tool (RMAT) are classified and, therefore, not available to the public."

■ It's a question about what a society tolerates, and where people draw the line. Most likely in some years from now we will hear the common sentence that retired government ministers and officials of administrations like to utter when admitting mistakes. It always begins: "In retrospect we should have ... ."

By the way, I also would be careful with the information Wikipedia offers (or hides); truth and fantasy have become densely interwoven – and everybody can add her or his public relation "facts" [5].

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## Wikipedia: Information you can trust?

Peter A. Rinck



**O**n the shelves of my office I have all the textbooks and encyclopedias I need – basically more information than I can ever read, let alone digest and understand. Still, if I want to know something about facts, names, even diseases, I usually go straight to Wikipedia, as everybody does today.

My recent personal experience with Wikipedia has not been positive. I was reading its information about MRI, in particular its history:

"Nuclear magnetic resonance imaging is a relatively new technology first developed at the University of Nottingham, England. The first nuclear magnetic resonance image was published in 1973 [two references] and the first cross-sectional image of a living mouse was published in January 1974 [one reference]. The first studies performed on humans were published in 1977 [two references]. Dr. Raymond Damadian, an Armenian-American scientist, who while researching the analytical properties of magnetic resonance, created the world's first magnetic resonance imaging machine in 1972 and was awarded a U.S. patent for the first MRI machine in 1974. He subsequently went on to perform the first MRI body scan of a human being on July 3rd 1977 [1]."

Since I was involved in MRI since its early days, I know exactly how, when, and what happened – and who did it. A compressed overview is given by the EMRF [2].

MRI was not invented in Nottingham and there is no connection between the references given and the claim. The references cite two articles by Paul C. Lauterbur, a U.S.-American who invented MRI in September 1971 and published the technique and the first results in 1973. The third reference in the Wikipedia article is an obscure paper in an online magazine. The statements and references in the following sentences are plain wrong. There was no MRI machine in 1972, nor was there a U.S. patent for the first MRI machine in 1974. This is sloppy work; even worse, the facts have been fabricated to promote a person who has claimed for decades that he is the inventor of MRI.

One of Wikipedia's objectives is that articles should be based on reliable, third-party, published sources with a reputation for fact-checking and accuracy. This doesn't work since contributors can be anonymous and contents are not checked by authorities in the field. How do you control around 90,000 active contributors, check their entries, and vouch for millions of them? At this point, crowd-sourcing becomes a pipe dream and doesn't solve the problems of very limited credibility of a self-proclaimed source of facts such as Wikipedia.

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**In science, avoid Wikipedia.  
In life, think twice before you trust  
Wikipedia. For crossword puzzles,  
though, Wikipedia is perfect.**

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"Wiki" is a Hawaiian word meaning "fast" or "quick"; "pedia" has Greek roots and stands for "education." Somehow, both components don't fit into one concept. In science, avoid Wikipedia. In life, think twice before you trust Wikipedia – for crossword puzzles, though, Wikipedia is perfect.

■ Moving on to printed information, I divide it into authoritative, trustworthy, less trustworthy, and most likely wrong. I also use this scale to rate scientific journals, some of which can be trusted, some of which publish articles of dubious character. I have also learned that you can't rely upon people who claim that their business is self-regulated and controlled – at the "highest ethical standards" – such as banks, politicians, the secret services, and scientific journals and reference media.

In 1942, the U.S. sociologist Robert Merton wrote:

"The self control mechanism of science is based on a social agreement: Authors should accurately report about their findings, reviewers should judge papers only on their scientific quality, and editors should select only the best scientific papers to communicate and advance scientific knowledge [3]."

Unfortunately, this is no longer the basis for selection and publication in most scientific journals. There is no more social agreement. Egocentricity has killed it. Authors, editors, and publishers have different agendas and goals, and in many instances the self-control mechanisms are not properly obeyed, most likely not even properly understood.

If we look at the major radiological journals, only few of them force their prospective contributors to comply with strict guidelines, including a statement about possible nonscientific interests, be they commercial, financial, or political. Certain publications even demand that one or several contributors warrant the contents of their article to be accurate and true, taking responsibility for the integrity of the publication.

By contrast, in most journals there is also a *laissez-faire* attitude, a laxity toward carefulness, accuracy, and exactness. For example, earlier this month I found an interesting section with several articles about the development of global population in a monthly publication (whose name should not be mentioned). It was accompanied by beautifully colored graphs in a hand-painted look, but already the first one was wrong: The captions of the different curves were incorrectly attributed. Perhaps it was an honest mistake, but I checked the figures of the next article – they looked too pretty, the curves of population growth too smooth and shaped too nicely to be real. I stopped reading because I didn't trust the contents any more. Editing mistakes and easy results rapidly damage the reputation of a publication

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## CAD as CAD can

Peter A. Rinck



**T**wo years ago my banker told me, beaming with joy, that his bank had helped a medical company go public and that he had bought some shares for me. "I have seen what they are doing, it's just fantastic: computer-aided detection and computer-aided diagnosis."

He was hardly stoppable on the phone when he explained to me what CAD can do and what the newcomer to the stock exchange will do: assisting any kind of doctor or paramedic in the interpretation of digital images, including CT, MRI, and PET. Like a pro, he talked about image processing, artificial intelligence, mammography, medical screening, and lung cancer. And they had something, some completely new technology, that nobody else had.

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**After several years doing research in automated information extraction from MR images, others and I had come to the conclusion that such methods are unreliable in clinical routine. A breakthrough would be good ...**

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They must have invented something I didn't know about, I thought. I hadn't followed closely the development of CAD for 15 years. After several years doing research in automated information extraction from MR images, others and I had come to the conclusion that such methods are unreliable in clinical routine. A breakthrough would be good for the new company – and hopefully good for me too.

■ Some nights ago, I stumbled across an interesting and entertaining software program on the Internet. It was also a kind of computer-assisted diagnosis, created by Dmitry Chestnykh, a 28-year-old Russian software programmer [1].

The algorithms of the program analyze the writing styles of people and ascribe them to an author. Works from 50 of the main authors of the English language have been fed into the system and can be compared to text samples.

I tried it. First, I typed in part of a column I had written last year. I received a diagnosis: "You write like H.P. Lovecraft."

I had never heard of Lovecraft, but found out that he was an American author of fantastic and macabre shorts stories, and master of the Gothic tale of terror. It's an interesting description, and it challenged me.

Copy and paste is easy. So I pasted more columns into the "How do I write?" form. The responses changed from Lovecraft to Arthur C. Clarke, back and forth. Clarke was another science fiction writer.

Then I copied and pasted two pages of Ernest Hemingway's prose from his story "A clean and well-lighted place." It was written like Ernest Hemingway. I tried Hemingway again; he was now writing like James Joyce.

Joseph Conrad writes like Agatha Christie, Agatha Christie writes like Isaac Asimov or perhaps H.P. Lovecraft. Henry Wadsworth Longfellow's poem "A Psalm of Life" was written in the style of Charles Dickens.

I got more curious and pasted one of my columns translated into Russian in Cyrillic into the form. In Russian, I write in the style of Douglas Adams, who was British. Personally, I don't believe that I write science fiction or horror columns. Some of them might be parables.

The computer-assisted diagnostic program for literature works at random.

■ CAD in mammography, however, does not work at random. In a study published some weeks ago, Dr. Joshua J. Fenton of the University of California, Davis, and colleagues, analyzed data from more than 1.6 million film-screening mammograms carried out between 1998 and 2006. They found: "CAD use during film-screen screening mammography in the United States is associated with decreased specificity but not with improvement in the detection rate or prognostic characteristics of invasive breast cancer [2]."

An accompanying editorial published in the same issue of the Journal of the National Cancer Institute is worthwhile reading – for me it is the paper of the month [3]. It's "CAD as CAD can." The author, Dr. Donald A. Berry from the M.D. Anderson Cancer Center in Houston, sums up as follows:

"An argument for the use of CAD with film or digital mammograms is that it will get better over time. Fine. Researchers and device companies should work to make the software ever better. But this should happen in an experimental setting and not while exposing millions of women to a technology that may be more harmful than it is beneficial."

■ When I recently checked my share portfolio, the value of the CAD company had dropped from 50 euros (around \$70 U.S.) to 3 euros (around \$4 U.S.). "Their programs seem not exactly to work as thought," my banker told me. "It's a write-off."

Indeed – it is.

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## Let's "scan" the patient. Or: Is it OK to refer to an MR "scan"?

Peter A. Rinck



I admit I have used and done it too. It's so easy to do, and everybody around accepts it. I have used the terms "MR scanner" and "MR scanning" of a patient. The problem is that magnetic resonance machines are not scanners. They are equipment, contraptions, apparatuses (as ugly as it sounds), perhaps even imagers or whoppers, but they don't scan the body of a patient in the real and original sense of the word.

Originally, a scanner was a zigzagging, moving scintillation camera used in nuclear medicine to record radiation in the body of a patient: the scintiscan, abbreviated simply "scan." If you had problems with your thyroid, you would get a scan with radioactive iodine or technetium to detect overactive or less active areas in the gland. Or a whole-body scan was used to check for cancer spread to other areas of the body. In the early years after the invention, printout was numbers, ciphered measurement next to measurement, with a clattering line printer. Later these numbers were color-coded in small dots; red was for a hot spot of high enrichment.

With the advent of computers in x-ray examinations, the term was also applied to computerized axial x-ray tomography: CAT scanners.

■ To scan means to make an intensive examination of a small area or to make a thorough search of a wider area; you can scan the horizon or the pages of a book. Medical scanners traverse the body with an active or passive sensing device and collect data. However, scanning, *per se*, does not mean imaging. It's the step before imaging.

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### There have even been legal procedures concerning the term 'scan' in magnetic resonance imaging.

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There have been major controversies concerning this term. I even know of a legal procedure in the U.S. with respect to a patent and other publications, using

the word "scanning" in the context of MRI. Somebody had claimed that scanning for T1 changes in tissues was the same as imaging. It was not. The judge went back to the roots of the word:

"At no place in the patent application, or in any other documents in evidence that were written before the patent was issued, does the word 'imaging' or any derivate or synonym appear. For reasons more fully developed [elsewhere], plaintiffs' arguments that passages in the application somehow refer to imaging are, to put the point mildly, interpretations that the words will not bear [1]."

This was written in 1986. During the last 25 years, daily common medical and lay language has changed. Semantic changes happen although some people observe them emotionally and don't accept them. The meaning of words change, the sense of a word expands, sometimes even turns to the contrary.

■ We have learned about another misapprehension at medical school: "I've got the flu." Well, no, actually you've caught a cold.

What did we learn at school today? "She should get an MRI scan." No, she should get an MR exam.

The language train has left the station a long time ago, and everybody uses "MR scan." I will do the same – misuse the word, as everybody else does. But it doesn't hurt to be aware of the difference, especially when the distinction is important.

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## Commercial forces can distort reality in imaging

Peter A. Rinck



**T**his morning, still partly asleep, I read on my toothpaste tube that the toothpaste provides "complete care." Later in the day I found a similar slogan in an infotainment article of a high impact factor radiological journal.

Many medical doctors, among them radiologists, also promise complete care: complete diagnostics, everything in one hand, the one-stop-shop. I wonder where they got that idea from. In some minds, imagination and reality seem to have traded places.

Yet, the idea is being heavily supported by some companies – not only manufacturers, but also insurance and hospital groups. It's part of the intensive commercialization of medicine, radiology included. The two major radiological congresses, the annual meeting of the RSNA in Chicago in November and the ECR in Vienna in March are among the major platforms for commercialized radiology, and Germany's Medica and Arab Health add to it.

■ An increasing number of radiologists complain about manufacturers targeting directly referring physicians and the media with the message that they should request patient examinations with ultrahigh-field MR equipment.

"The diagnostic overkill has been intensified by the marketing departments of the big players in the field putting commercials into mass media targeting other medical disciplines and the general public. American and European manufacturers try to sell more of their expensive machines through back-door blackmail and pressure," I heard at the ECR in Vienna this year.

A number of private practices, and even some big hospitals, have given in to unproven claims about the superior performance of high-end 3-Tesla MRI equipment and PET/CTs. Some private centers are even considering the idea of acquiring 7-Tesla machines.

"We are killed by rumors that 1.5-Tesla is inferior to 3-tesla in diagnostics," added one enraged German radiologist.

The 3-Tesla machines are promoted by manufacturers. They have up to 20% more signal-to-noise (not 100% as promised), less gray/white matter contrast than 0.5 Tesla (even if you enhance normal gray/white matter contrast with a gadolinium contrast agent), are more expensive – but also more fashionable in certain circles.

Google tells you: "A body scan can save your life" – and Amazon would tell you and might announce soon: "These customers also buy Louis Vuitton bags and botox for lips, forehead, and other parts of the body." Do we have to wait for something like that?

Do we need equipment for the less than 1%, or perhaps a tenth of 1%, of patients (or rather customers) in whom you might detect something that may be considered pathological? Such equipment is perfect for research institutions, perhaps university hospitals, but not for "real" daily life patient care.

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**"The amalgamation between medicine and massive financial interests has not led to an improvement of health services, but rather to deterioration."**

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The amalgamation between medicine and massive financial interests has not led to an improvement of health services, but rather to deterioration, both in the arts of diagnosis and healing, and in ethics too. When I had problems with my right knee three years ago, I went to an orthopedic specialist who made the exact diagnosis after listening to my history and a short physical examination. He proposed to remove the torn tissue, but first he wanted to confirm his diagnosis with an MRI examination – although it's not really necessary, he conceded – without looking at me.

The MRI exam was a mere curiosity from my side. The orthopedic specialist was one of the owners of the equipment. We both knew that the sensitivity and specificity of an MR study and the clinical examination by a good doctor are the same. The same holds for CT and other technologies.

■ At the 2010 RSNA meeting, Dr. David B. Larson (director of quality improvement, radiology, at Cincinnati Children's Hospital Medical Center, Ohio) underlined that the use of CT in hospital emergency departments grows exponentially, despite all the odds, among them high costs and radiation exposure. Whereas in 1997 one in fifteen patients above 65 underwent CT in the emergency department, the number had increased to one in five in 2007, he said.

The number of emergency department visits that included a CT examination increased from 2.7 million to 16.2 million – a 5.9-fold increase and a 16% compound annual growth [1]. Such studies, lectures, and publications are of utmost importance. They even make the evening news.

Perhaps attending the RSNA is not such a bad idea after all. Then you don't have to wait for the bad news.

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## Are smartphones changing behavior in medical practice?

Peter A. Rinck



There are certain images we register unconsciously, with the precision of a camera, and they return into our minds every so often, quite clearly, almost as a déjà vu. For me, one of them is a corridor with a white-clad person avoiding any eye contact with me while typing a text-message into a little black machine. It seems to be a common picture, and is a recurrent small-talk topic during recent months, both with colleagues and friends.

So, have LBMs (little black machines, a.k.a., smartphones) changed our behavior in daily medical practice?

■ They seem to be everywhere now. Adolescents and male adults show them around and compare them as if they were the greatest achievements of their lives. Most likely, they are. Women do it too. The devices are touched and handled all day long with more or less dirty fingers; I have even seen people who lick their screens to clean them. Toilet seats are often cleaner than computer keyboards and smartphone screens. Your little machine is a zoo of germs.

There are numerous publications about the psychological background of the users of smartphones and similar gadgets. I don't want to add to them. I also don't want to add to the never ending discussion of their advantages and disadvantages. I just want to pinpoint their destructive influence upon bedside manner.

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**It's time to make a New Year's resolution. You won't lose weight, exercise more or smoke less. Just make sure you leave your smartphone in your pocket when you deal with patients and friends.**

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Polite and professional physicians – or in this context, anybody dealing with patients - follow the simple basic Hippocratic rules by being tidy, honest, calm, understanding, and serious. They try to adapt to

other people's feelings and put themselves in the patient's place; a sick person needs understanding and encouragement – and human contact. There are too many hidden fears and tensions on and beneath the surface to be attended to.

Smartphones are toys, or perhaps ersatz-shrines one prays to and that can respond, giving contentment and comfort. A recent article in the International Herald Tribune underlined this: "Matt Rodgers ... led an Apple team that wrote software for iPods. He loved his job and working for Apple, he said. But he added:

"In essence, we were building toys ..." [1]

■ Playing and chatting is not a doctor's job. Doctors are there to give contentment and comfort to their patients. Looking bored or staring at a toy and playing with it, even if it's only a nervous habit, makes people think doctors want to escape from them and that they are disinterested. They may get the impression that doctors are only waiting for the next "ding", for the next text message from somebody outside - and they're right.

Such physicians come across as unreliable and insecure. They don't exactly strike the patient as being respectable: instead, they look rude, playing with a fashionable toy. "Why does she hold that black thing in her hands and check it all the time? Doesn't she know what she should do?"

It's one step worse than pulling a medical pocket manual out of a white coat and starting to read it in front of a patient. Actions can speak as loudly as words, and this one means: I am not confident and knowledgeable enough to help you. And the little computer? Is all the missing knowledge buried in the little machine? Or is it a psychological climbing rope and an indicator, showing the user belongs to the new and better medical generation? It gives the impression that the device makes the person omniscient.

Instead, doctors should check the book and little black machine in their office or when they are alone.

Anything else is not good medical practice. Outside, carry a smile or pleasant expression on your face. You shouldn't hold your smartphone in your hand, it doesn't give you any higher prestige; you should rather hold the hand of the patient. Look at him or her, maintain eye contact, don't look at your machine - and don't play with it or text with one hand. Multi-tasking is not part of a doctor's job description.

Make this your one and only New Year's resolution. You won't lose weight, exercise more or smoke less. Just leave your smartphone in your pocket when you deal with patients and friends.

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