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Tradenames confuse, bewilder, and amuse

Peter A. Rinck

PRO ACADEMIA EMRF THE ROUND TABLE FOUNDATION

Working in radiology exposes you to numerous companies and products. Many of them become household names, such as the major firms and their machines, films, and contrast agents. Some are family names, such as Siemens, Guerbet, and Bracco. Others are plain, meaningless inventions. Kodak, for example, was coined by George Eastman in 1888. He was under the erroneous impression that a trademark should not have a dictionary meaning. Other names were created as a company evolved. When Norwegian Nyegaard & Co. expanded throughout Scandinavia and the globally, its name was altered to Nycomed.

Not only radiological customers rely upon these well-known names, and use them to make a judgment about whether to buy – or at least recommend – trust, or distrust the company or product. However, as in other areas of business, vendors are often just merchants. Customers buy products with a recognized company logo on the outside, but the product may be made by somebody else. You can have the same radiological equipment made by company A, but sold as a brand of companies B, C, or D.

Careful contemplation is needed when naming a product or company.

The more consumer mentality spreads into radiological circles, the more new products are introduced and the more new names have to be invented. To protect these new names, the company has to apply for a tradename or trademark. Sometimes, these may not be approved in some countries, because a similar sounding name already exists. Problems arise when there are two products with the same or comparable names.

In this age of global players, companies want tradenames that can be used across the world and that are easily distinguishable. They should have favorable connotations and be easily remembered. This can be difficult: What might be an attractive name in one country or language might sound awful or even offensive in another.

Generic names in pharmacology are usually linked to a molecule or compound; very often they sound rather peculiar. To me, mangafodipir, the generic name of Teslascan, sounds rather Icelandic. On the other hand, Teslascan is easily recognizable as a product connected to MR imaging. Cook's contrast agent Oxilan is readily linked to its generic name ioxilan.

The same holds for machine names. Magnetom, for example, is the term coined by Siemens for their MR machines. It is simple and straightforward compared with Otsuka Electronics' 1.5 Tesla MR machine called OE 1.5 SI. This sounded like a car model or a serial number and was finally renamed Oracle.

There is usually one name for one product, but in some instances the same item is sold under different names. In Spain, for instance, the MR contrast agent gadopentetate dimeglumine was sold as Magnevist by Schering and as Magnegraf by Juste. This can also happen the other way around: Ferriseltz, an enteral MR contrast agent, is sold by Bracco in Europe and by Nycomed in the United States. The patent owner is Otsuka, a Japanese company.

The metamorphoses of company names that occurred in the last decade caused a great deal of bother for radiologists and marketing people.

In the United States, in particular, company names are adjusted to economic considerations. Turning upcoming privately held firms into joint ownership when going public often involves a change of name. In this way, nuclear medicine developer Diatech became Diatide, contrast agent developer Metasyn mutated to Epix, and Access Radiology was suddenly eMed Technologies.

But most upsetting was the change of traditional names: One day you buy contrast agents from the diagnostic imaging division of Sterling Winthrop, the next day it has become Nycomed; the same holds for Squibb Diagnostics which was taken over by Bracco. While customers could still follow some of these takeovers, others were absolutely confusing.

Du Pont Diagnostic Imaging in 1996 changed into Sterling Diagnostic Imaging which in 1999 was turned into an Agfa-Gevaert subsidiary. Also in 1996, the medical imaging division of 3M mutated into an independent company called Imation Corp. which sounded like many other names in the business: Imatron, Inovision, Imagyn, Imageon, Imagraph, Impax, you name them. By the way, Imation was taken over by Eastman Kodak in 1998.

This kind of re-christening is too much for average customers who need continuity in names and products, particularly if they do not make regular purchases. When a name disappears and local company offices closed, the occasional customer will not be able to locate the company – causing frustration and, for the company, loss of potential sales.

Changing names can also mean saying farewell to a trusted well-introduced partner.

There are very few new company names which inspire confidence.

There are very few new company names which inspire confidence. Hoechst or Rhône-Poulenc were well established, whereas Aventis, their new common post-merger name, sounds like a Korean car model. Marketing departments of the radiological industry should know that names are part of the "hidden persuaders"; they are subconsciously tagged with certain qualities of the company or the product which, improperly applied, might have a negative impact upon sales. Names are part of the company image. They should not be played with by management officials trying to be innovative and improve their egos – and failing miserably.

People swear by Siemens, Philips or GE as they do by Mercedes-Benz, BMW, or Rolls-Royce. This is despite the studies that show Toyotas to be more reliable and of better quality, and Volvos and Saabs to be safer, better built, and providing the same comfort and equipment at a lower price.

Marketing specialists know that customers like families of names: Ultravist, Isovist, Levovist, Echovist, Magnevist, Gadovist is one approach. In the case of Schering most contrast agents of the company have the same ending, independent of modality. Nycomed and Guerbet have a different approach: Omnipaque, Visipaque, Imagopaque, Omniscan, Abdoscan, Clariscan, or Hexabrix, Telebrix, Xenetix, Dotarem, Endorem, Lumirem. Agents of one category have the same suffix.

Many people involved in the field of radiology prefer that a product name has some connection to its use. Good examples are the many gastrointestinal contrast agents, such as Gastrografin, Gastromark, Lumirem, LumenHance, and Abdoscan. Others have no association, such as Gadolite or Ferriseltz.

Many hardware products can be similarly related to their purpose. Neuromag is a magnetic source imager; Signa and Gyroscan are MR imagers; other MR apparatuses have more flowery names such as Harmony and Symphony, or Eclipse and Polaris, that are not associated with magnetic resonance but, again, create a family of product names. This is in contrast to something more neutral, like Picker PQ 6000 CT scanner.

Trex was a newcomer among radiological equipment vendors some years ago. The company chose a simple but attractive name.

Sometimes, however, it seems that the bosses in charge follow the old joke about the couple contemplating the name of their soon-to-be-born baby: "And if it is a boy we will give him a biblical name: Cain or Judas".

In the best case, the name is also simple and attractive, but makes no sense whatsoever: Sahara, for instance, is an ultrasound-based bone-densitometer – but who would have guessed?

Then there are names nobody can pronounce: KinetDx, Mµsic KinetDx, ImaRx, NeoRx, GE Advantx Legacy D, or Indigo² KinetDx Impact workstation.

Finally, there are names with strange or even negative associations. This seems to be the case with a recent addition to the market: Sonazoid. It reminded me of Antoine de Saint-Exupéry's *The Little Prince.* His origin is the asteroid B612, not the sonazoid; but it sounds similar. In a poll of radiologists and cardiologists nobody of those asked could deal with this name. The ending "-oid" was identified as "similar to" or "looking like", but what is a "sonaz"? People cited numerous alliterations too cruel to print here, but nobody got the idea that it is a new ultrasound contrast agent. Although the "son" part could

be a hint, the word in its entirety does not have any mental connection.

On the other hand, radiologists are used to handle difficult names. “Iopamidol” is not a word you can pronounce easily, with or without a hangover.

Difficult names are not necessarily bad names. When you have learned to pronounce “Cactohexacoxl”, the new Mexican low-osmolality x-ray contrast agent, you will not forget it – because you associate Mexico, cacti, and Hexabrix.

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Politics and medicine make an unhealthy mix

Peter A. Rinck

PRO ACADEMIA EMRF THE ROUND TABLE FOUNDATION

The slogan of the Austrian Tourist Board used to be: "Austria makes people happy". This seems not to be the case at present, at least in the of some politicians and journalists.

There was a Europe-wide outcry this spring. Thus, to begin this column in a politically correct way and in accordance with 14 of 15 European Union governments: "Austria is a rogue nation; its government is full of extremists who are apologists for the Nazi politics of Austria during the Third Reich; and it should be made clear that Austria never has publicly acknowledged its involvement in antisemitic actions during that period. The involvement of the Freedom Party in the government is a sign that the Austrian population has not changed attitudes. Therefore the country and population have to be punished and reeducated by the rest of Europe and the world."

I have tried to find out what exactly is behind this mass hysteria. Everybody talks about it but nobody has hard facts.

If you read the governmental declaration of the Austrian central-right government, you won't find the slightest hint of anti-democratic, anti-human rights, racist, or anti-European tendencies. Based on this declaration you would have to expel France from the European Union because of the bloodthirsty lyrics of the Marseillaise ("To arms citizens! Form your battalions! March, march! Let impure blood water our furrows."). The Austrian government declaration sounds like a text from bible school (New Testament).

The real point at issue is populist comments and remarks by Herr Haider and some of his colleagues of the Freedom Party on foreigners, the SS, and similar topics. Herr Haider's party is partner of the coalition government, because the other major parties in Austria could not agree on a central-left coalition.

This is nothing essentially new in European politics. Within the European Union extremists have been members of French and Italian governments during recent years, and there are strong extreme right-wing movements all over Europe. The causes for this development are manifold, one of them is the secret fear that foreigners may move in and take away part of the wealth accumulated after the Second World War; another cause is nepotism and corruption over decades of a two-party led country. The therapy would be in cleaning up – in Austria and all over Europe. The fundamental political situation is not different in France, Belgium, Germany, Italy, or Great Britain.

No doubt that the Austrian state of affairs is unpleasant and potentially dangerous. Something must be done about the situation so that it does not escalate. Since Austria is a country with a democratic constitution and the entire process which led to the formation of this government was democratic, a democratic solution has to be found. I agree that pressure from outside might change the politics of a country; however, usually pressure from outside creates increased nationalism and thus is counterproductive. This is just what Herr Haider wants.

Basically, this foreign affair has nothing to do with radiology, except that the European Congress of Radiology (ECR) takes place in Vienna since 1991. I liked the words by Rolf Guenther, the president of this year's ECR, during the opening ceremony of this conference in Vienna in March:

"Regarding the current political situation in Austria, I have two comments. First, the ECR is a nonpolitical organization, and our presence in Vienna should not be seen as an endorsement of the current Austrian political scene; quite the contrary is true. Second, we are committed to liberty and democracy, and abhor discrimination of any kind. Recent European history places an onus on all of us to be vigilant, and to be constantly on our guard against extremism."

How to react

Some radiologists see this in a different way. According to a number of French and Belgian radiologists the best answer to Herr Haider would have been boycotting the European Congress of Radiology.

In our media-driven societies public opinion is sometimes running wild. I cannot understand this disproportionate boycott cry. The ECR is not the 1936 Berlin Olympics used by Nazi Germany as a propaganda show. You can boycott Austrian goods and Austrian skiing resorts, but not your own congress. The ECR is not an Austrian trade show. By the way, the French-speaking radiologists explicitly separate Austrian radiologists from the rest of the Austrian population; the Austrian radiologists belong to the camp of the good boys.

Another proposal is to move the offices of the ECR and the ESMRMB (European Society for Magnetic Resonance in Medicine and Biology) to another country. Again, where is the connection? I could understand if Simon Wiesenthal would decide to relocate his holocaust research center from Vienna to somewhere else, but whom do you punish by moving these offices? By the way, Simon Wiesenthal, together with many cultural and artistic dignitaries signed an appeal warning that the economic damage may soon dilute anger against Herr Haider and focus public outrage an Austria's European partners.

None of the other countries of the European Union has solved the immigration problem, mostly because it is a taboo topic that politician do not want to touch.

"ECR must not become a traveling circus."

Anyhow, ECR is going to move from Vienna to other European locations. This was already envisaged before the recent undesirable political developments in Austria.

After ten years in Vienna, for the year 2002 either Brussels or Barcelona are on the list of choices. Most likely, the meeting will be held in Barcelona because Brussels does not have the infrastructure for a conference of this size and caliber. Besides, the mayor of Brussels does not like Austrian and Austrian-based events to be arranged in the city. In a move of unique stupidity he first kicked out Austria from the Brussels Holiday Fair and then advised that Austria's flag must not be raised and that the name of Austria has to be glued over in all public relations material. This childish behavior reminds me of reactions of Nazi Germany or Soviet bloc officials when they wanted to show their power.

I wonder what would happen if Germany would decide that Belgium must not participate in the International Nuremberg Toy Fair because of the child molesting scandals in Belgium which shook the country and the world and has not been solved because of the unhealthy entanglement of corrupt politicians, police, and pederasts.

Look at it from a different point of view

Let's look at a medical example: We have a patient with sinusitis, nothing chronic yet, nothing recurrent. He visits several physicians. The first one tells the patient: "Wait and see". The second one prescribes antibiotics and pain killers. The third one proposes immediate radical operations of the entire family but not the patient, and the last one sends the patient to the hairdresser's to get a permanent.

Which therapy would you prescribe? Ignore the disease, treat it appropriately and with diplomatic tact, bomb the brains out of the entire population, or boycott the fascist Viennese taxi drivers? History repeats itself, but the Vienna of spring 2000 is not the Vienna of spring 1935.

People say: "Perhaps not yet." Nobody can predict the future, but of course you can learn something from the past. Moving an international organization such as the ECR will not have any positive influence upon the current political situation in Austria. It might only treat some of the symptoms of the disease, if at all, but definitely not hit the cause of the disease. Prevention would have been better than cure.

Were there any sanctions or initiatives like this one in the past, for instance against Great Britain because of the civil war in Northern Ireland? I did not see any similar reaction by European radiologists when France restarted nuclear tests. There is no outcry that communists were and are members of the French and Italian governments.

So let's boycott radiological meetings all over; most countries and their governments do or have done dirty – and definitely not democratic – business. No more radiological meetings in London, Paris, Madrid, Berlin, or Rome. I am looking forward to the French Radiological Society boycotting all its Franco-foreign associations of radiology, in particular the Franco-Algerian, the Franco-Moroccan, and the Franco-Syrian. Politics in these countries cannot be really considered democratic.

Ulterior motives?

Perhaps, there are some ulterior motives behind the idea of shutting down the ECR offices in Vienna and moving the congress elsewhere. The success of this conference is seen as a threat by others. In a recent article by Adelfio Elio Cardinale, the president of the Italian Society of Medical Radiology (SIRM), the antagonism of some European radiologists against ECR becomes quite apparent [1]. According to him, ECR threatens the biannual Italian Congress of Radiology, not because of the scientific or educational content of the conference but – hidden in a long and flowery text – rather because he fears that the commercial exhibition at the SIRM congress will shrink.

Among the few who should not fear ECR are the *Journées Françaises de Radiologie* (JFR). This congress is the biggest national congress of radiology in Europe. It has a similar number of participants and exhibitors as ECR and an extremely good organization and scientific program but, since it is a national conference, 90% of the attendees are French.

Some of their organizers feel that ECR and JFR are in competition, but they are rather supplementing each other, although more so than other national congresses. The best solution for these two congresses, and perhaps other national congresses would be a coordination of the continuing education program, a challenging but necessary task for the European Association of Radiology (EAR).

"Moving a congress is costly, inconvenient, and a logistical problem."

This cannot be done by turning ECR into a travelling circus which will be held in conjunction with different national conferences every other year, as Cardinale demands. Such a step would be detrimental for the creation and stability of ECR as the ultimate radiological scientific platform for Europe and would send more European radiologists across the Atlantic to the RSNA. We do not need another radiological social event like the International Congress of Radiology or some of the national congresses.

Only losers?

Permanently moving a congress from one place to another is very costly, inconvenient, and a logistic problem. Today, membership in ECR and, hopefully in the future, a European Society of Radiology is a bargain. I do not believe that the members appreciate waste of money.

The biggest losers will be the radiologists from Eastern Europe. For them, Vienna is relatively easy to reach, Barcelona is far away and, most likely, even more expensive.

Nearly one quarter of the participating radiologists at ECR come from Eastern Europe, only 5% from French-speaking countries. Italian radiologists present 12%, Scandinavian 15% and those from German-speaking countries more than 22%. In Barcelona, the center of gravity will be displaced. However, perhaps a congress in Spain will attract more participants from the Hispanic peninsula and France.

One final thought: Arnold Schwarzenegger, also an Austrian, portrays in his movies characters far more violent than Haider. His movies have a real impact on children and young adults. He wants to become a politician in the United States. Ever thought of boycotting him?

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Bureaucracy and waste tarnish EU grants

Peter A. Rinck

Money is scarce for basic research in medicine. If neither the universities nor the state have surplus cash, researchers have to look elsewhere. The European Union is a leading option.

In medicine, and thus radiology, there is the Fifth Framework Program, which is called the *Fifth Framework Programme* in Brussels. Part of it is called *Quality of Life and Management of Living Resources* which sounds like an incentive of a travel agency but in reality it is the Edith Cresson Memorial Fund.

In 1998, the ministers in charge of science in the members states of the European Union delayed the entire four-year program by eight months. Together with the member of the European Parliament they could not agree upon the amount of money to be put into this program.

The amount they quarreled over is minimal compared to the rest of the EU budget: The Union spends nearly 50% for agriculture and most of the rest is pumped into structural aid for underdeveloped regions in Europe (which includes moving the European Parliament once a month from Brussels to Strasbourg and back, including tons of files and bureaucrats).

Just 3.8% are allocated for research. The rest is lost in accounting.

The application

Here is the diary of our application:

1 January. The university is closed. So are all offices of the EC in Brussels.

15 January. The university has turned on the heating again. Nobody answers any telephone calls in Brussels. I call somebody who knows somebody whose uncle has heard that there is a new call for applications for EC research grants. It is posted on the internet and on billboards in the Athens' subway. I decide against flying to Athens and go for the internet. It would have been easier to take a train to Greece and buy a subway ticket.

18 January. I have found the program announcement on the internet. I feel relieved. For some reasons it cannot be found at ...@ec or ...@eu or something similar, but at ...@cordis. One learns step by step.

To apply for an EC grant one used to have to fill out endless forms in a typewriter because nobody in Brussels had heard of word-processing. This year they finally have forms for word-processors.

19 January. The last conclusion was wrong. They have forms. They are on the internet. However, our laser printer cannot print out the forms. It must be our fault.

21 January. We are still trying to print. We know that one needs Adobe Acrobat Reader version 3. We have downloaded that software with the help of the EC. Unfortunately the Brussels' forms are in Acrobat 3.02, but only 3.01 is available from the manufacturer.

25 January. We have bought a new printer. Finally, we can print the forms. Technology is a miracle. Internet is the technology of the future. It would have been easier to get the forms by mail from Brussels; but who wants to fight progress?

26 January. Of course it would be stupid to fill out the forms using a typewriter. One should be able to use the computer. Of course this is possible; however, you cannot save the contents. When you close the program, all your work disappears.

5 February. The EC announces a new software developed together with Price Waterhouse and some other consulting and software companies. It is called ProTool. It will facilitate grant applications and remove all problems. We are looking forward to it. The application deadline is in May ... still a long time to go.

15 February. The new software has been released. We try to download it from the web.

18 February. We are still trying.

21 February. We have succeeded.

22 February. It still doesn't work.

24 February. We had to buy a new computer; it seems that everything older than a year cannot handle the new software. Our new computer was able to run ProTool once; but once only. It seems that it is written for Windows 95, but our software is Windows 98.

3 March. We have hired one additional software engineer because the application guidelines say explicitly: "You are strongly advised to submit the forms electronically".

"We have wasted several man-months of senseless work and an enormous amount of money for unnecessary new equipment because some people connected to the European Union play around with non-functioning technology."

15 March. We give up. We will not be able to submit a proposal before the deadline. We have wasted several man-months of senseless work and an enormous amount of money for unnecessary new equipment because some people connected to the European Union play around with non-functioning technology.

Later we found out that hardly anybody was able to submit proposals on the internet with the EU software. People who were more intelligent typed everything using a typewriter and sent their proposals by mail.

12 October. We have submitted a nicely typed proposal ready for the second deadline on 15 October.

15 October. We just found out that the deadline has been changed to the 15 November. No explanation is given why it has been postponed.

21 June (of the following year). We have still not received a letter of receipt for our application. This letter should have been mailed out immediately after the application arrived in Brussels; and there is still no answer on the outcome of the application.

The response to our monthly call to Brussels is always the same: the head of the unit has the response letters on his desk but has not found the time to sign them.

Interlude

There is another grant program called INTAS. It is aimed at supporting cooperation between EU universities and research institutions in Eastern Europe. We want to cooperate with a Russian university.

The application is easy. You just have to fill out some forms. The only way to fill them out is on the internet. Of course this is a big advantage because one does not have to send forms by mail to Russia and back. You just type in your part, the partners can read it – and make changes if necessary – and then the file is forwarded over the net to Brussels for evaluation. To guarantee confidentiality there is a password for all participants.

The first exchanges between us and the Russian university were successful. Technology has its advantages. Then suddenly the log-in is blocked. Hectic e-mail exchanges between us and Russia follow. Finally Brussels is contacted. After several days of silence, there is an answer: The software is programmed in a manner that files are closed and locked for good if one partner makes a mistake when filling out the forms.

No, the file cannot be opened again. Yes, one has to start with a new application for a new password and fill in all forms from the beginning. Yes, nobody is perfect.

The evaluation

To guarantee a fair selection process of all applications to the Fifth Framework Program, the proposals are checked by a board of scientific experts who have to travel to Brussels and stay there for a week or two. I was invited as an expert for diagnostic imaging of Alzheimer's disease – and eventually evaluated proposals concerning hips and knees.

For the evaluation process, the EU emptied a large building in the city center, refurbished the rooms

with elderly chairs and desks and switched off the water in the toilets and the air-conditioning at outside temperatures around 30 degrees. At the entrance the experts were greeted by an EU official with a hairdo like the lead singer of the Leningrad Cowboys. He distributed name tags and forms to be filled out.

For each topic several hundred applications from all over Europe were submitted. Preparing such an application takes several months and costs at least EUR 10,000, perhaps even 20,000-25,000. In other words, the applicants, be they universities or companies, invested several million euros in their applications.

At the beginning of the evaluation procedure each expert received 12-15 anonymous applications and was told to reject 85% of them in the first round.

At the beginning of the evaluation procedure each expert received 12-15 anonymous applications and was told to reject 85% of them in the first round. In other words, of 12 applications 10 are to be rejected immediately. Depending on the mood of the expert, this is done by painstakingly checking each application, reading only the first page, or searching for spelling errors. British and Italian experts seem to try to find out which applications originate in their countries and push only those.

Finally, a decision based on scientific merit is made; then the selection is handed over to the upper echelon of EU officials – and you never know which project will get support; there is a veil of secrecy and no independent control.

In the July-August 1996 issue of the radiological magazine *Diagnostic Imaging Europe*, Philip Ward, wrote in his editorial:

"... clearly, the EC is holding out an olive branch, and researchers must respond positively and seize the opportunity with vigor and enthusiasm."

I am very enthusiastic about the idea of the European Union, but one's enthusiasm evaporates rapidly after having seen the chaos and ignorant unwillingness of high-level bureaucrats and politicians trying to find viable ways to administer the money we pay for Europe.

As for the olive branch: We have started planning several plantations with 10,000 olive trees each. With the subsidies we will get out of the unlimited agricultural budget of the European Community we will finance some medical research. They say the new forms are easy.

P.S. The people actually involved in the organization process are not to be blamed. They are like the ground staff of airlines, who are not responsible for the flight delays.

P.P.S. This column was written before we finally received the rejection letter for our proposal. According to the expert referee, we are not competent to build flight simulators. I agree. On the other hand, we had not proposed to build a flight simulator. Who needs flight simulators in medical imaging?

We had applied for an update of the magnetic resonance image simulation program "MR Image Expert". We developed the new version without help from Brussels.

P.P.S. The part about the Athens subway has been invented, as are the contents of the last paragraph on olive trees. The rest is true! This column is not a satire.

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Radiologists play god at their own risk

Peter A. Rinck

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Gene manipulation continues to grow as a topic for discussion. The argument that radiologists are not professionally affected by this issue and so should not get involved with the debate is misguided. Radiology is moving increasingly into therapeutic medicine, the latest step being the inclusion of radiologists in gene therapy teams. Gene therapy will eventually correct genetic deficiencies, such as severe combined immunodeficiency cystic fibrosis, and treat a variety of malignant diseases, including oncologic and chronic pathological processes like peripheral arterial ischemia. Nobel Prizes have already been awarded for this sort of research.

Two excellent reviews of gene therapy, one of which includes a glossary, have been published in *RadioGraphics* [1,2]. Both articles provide insight into this exciting new medical and radiological field, and they stress the crucial role for radiologists in diagnostics and therapeutics.

Molecular imaging links diagnostic radiology to gene therapy.

Diagnostic radiology is moving toward molecular imaging. New techniques are being developed to image genetic manipulations, to perform in vivo screening of novel drugs, and to understand functional molecular events in living organisms at cellular and molecular levels [3].

Everybody seems to have an opinion concerning gene manipulation and gene therapy, but hardly anybody has any solid information. The implications of gene technology will be tremendous, and radiologists will be the accomplices of those who have developed the altered genes for gene therapy, whether the outcome is positive or negative.

Gene therapy and molecular imaging are only the latest in the explosion of new technologies in therapeutic and diagnostic medicine that emerged during the last century.

One major contribution was the discovery and development of antibiotics in the fight against infectious diseases.

I learned to use antibiotics carefully in medical school. Try to identify the bacterium and test its susceptibility against antibiotics before you choose one and start therapy, I was told. It was considered the medical equivalent of a cardinal sin to prescribe an inappropriate antibiotic or to provide a course of antibiotics that lasted less than 10 days (even if the symptoms of the disease had disappeared).

Times have changed. Manufacturers of antibiotics now produce drugs by the ton and sell them as animal fodder to overcome inadequate diet and imperfect management practices in animal breeding. The cost of using antibiotics in healthy animals is said to be 60 euros per sow on a small farm; if production is concentrated at big farms, the cost may exceed 150 euros per animal. Many farmers are unaware that antibiotics are part of the fodder they give to their animals. Restrictions on the use of antibiotics in humans still exist, but the limits we learned at medical school do not apply to cows and pigs. The danger of creating the resistant bacteria that we were warned about is of no concern in animals. Increasingly, however, there are reports that resistance to antibiotics creates havoc in the treatment of infectious diseases.

The connection to radiology is not obvious, but this is just the first reminder of how things can go wrong when economic advantage allows some people to take action for which the rest of humankind later has to pay the price. Infectious diseases and resistant bacterial strains are on the increase. Just ask your colleagues in internal medicine.

Nuclear medicine and radiation therapy are twins of gene manipulation medicine. Diagnosis and treatment with radioactive isotopes grew out of research into nuclear arms and nuclear power. Nuclear science has contributed substantially to diagnosis and treatment of patients and to the understanding of metabolic processes.

Compared to gene manipulation, nuclear science can be controlled easily. Gene manipulation cannot be controlled because access to the technology will be simple. While you will be able to manipulate genes in your garage, building a hydrogen bomb is more difficult. Gene manipulation and its associated medicine will have a similar outcome to technology and medicine: major advances in the treatment of a number of diseases, but also be terrible accidents of a magnitude that we cannot imagine. Genetic manipulation is the ultimate tool with the ultimate risk.

What can go wrong? Numerous unforeseen outcomes have to be considered. Examples in agriculture already exist. One known possibility is unwanted gene transfer. Antibiotic-resistant maize (corn), for instance, already exists. The genes from this strain of maize can be taken up by bacteria in the human gastrointestinal tract and incorporated into human genes, making the unwitting recipient resistant to antibiotics.

As the Chinese proverb says: "Who rides a tiger cannot dismount any more." Or, in the language of a common U.S. dictum: "If anything can go wrong, it will" (Murphy's Law).

Companies involved in the development and use of genetically manipulated plants and animals stress that there are no hazards, yet they fight any legislation that would make developers and vendors responsible and liable for their products and any side effects they may cause, even years after initial introduction. Perhaps this is a sign of insecurity. Given the strong interrelationship between the drug companies and the politicians in charge, they will doubtless avoid the consequences.

Another Chinese proverb accounts for the companies' standpoint: "Who can tie a bell around the tiger's neck is also able to untie it."

But there is a third Chinese proverb: "Whether you hurry or walk slow, the way in front of you stays the same." There is no hurry in genetic engineering.

Learning from mistakes

People seem reluctant to learn from mistakes. Greed has become a major factor of our lives, and businesspeople and politicians control medicine. Despite a deep mistrust in the decision-making process, demands that gene manipulation be discontinued are naive.

Daily vigilance and discussion are the only way to steer free of the extremes. Historical experience is a constant reminder that we should never take peace, freedom, and democracy for granted. It is up to us to help supervise this system so that it does not get out of control. Too many influential groups put their own well-being, money, and power first. State and supranational bureaucracies will not react in time, nor will they function properly, if lobbies are in pursuit.

One of the arguments in favor of gene manipulation is the historical nature of cross-fertilization experiments; e.g., Gregor Mendel and his studies on pea plants. Most of these early studies were carried out on plants, but a few experiments were performed on animals, too. Those pigs with additional ribs are excellent for barbecues.

Today we can perform such experiments in a more sophisticated "scientific" manner, or what we believe is scientific. We could eliminate inborn diseases, reducing the need for euthanasia and abortion. We could also eliminate certain race-specific features, or even entire races. Where do we draw the line? Somebody has to decide, sooner or later. Never before in medical history have the stakes been higher.

Farmers will be blamed if something goes wrong in agriculture. In medicine, it will be the doctors – not the politicians.

On the other hand, I am looking forward to the genetically engineered radiologist with four eyes, who can see like an eagle. This futuristic person might help me find the envelope containing x-rays that I put aside yesterday to show to a colleague. Where is it?

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