Laurea Honoris Causa in Honour of Prof Luc Picard

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Laudatio, Prof. Leonardi

Luc Picard is Professor of Neuroradiology of the Faculty of Medicine in Nancy, France. Past Director of the Department of Diagnostic and Therapeutic Neuroradiology at the University Neurologic Hospital - Nancy, he is Head of Neurosciences Head and Neck Federation.

Having stood first in the entrance examination for Residency in 1961, he was at initially attracted towards Neurology. However he was soon fascinated by Neuroradiology, and obtained specialty Diplomas in Neuropsychiatry and then Radiology. Having been appointed Associate Professor of Radiology in 1970, he took charge of all the neuroradiological investigations of the Nancy University Hospital. His dedication and increasing work load gradually allowed him to expand first into a Division of Neuroradiology and later into a full fledged independent Department of Neuroradiology of which he was appointed Director from 1977 .

Appointed to the new chair of Professor of Neuroradiology in 1984, he began his efforts for the development of Interventional Neuroradiology. Given his clinical background he was interested in Interventional Neuroradiology from the beginning of his career in Neuroradiology. He created, at Nancy, a laboratory for Experimental Neuroradiology, a large part of which was devoted to Interventional Endovascular Neuroradiology.

In 1980, he developed the treatment of cerebral and spinal arteriovenous malformations and aneurysms. At the conclusion of his carrier has been appointed as Director of the Nancy Neurosciences Head and Neck Pole.

He organized the annual meeting of the Working Group in Interventional Neuroradiology (WIN) at Val d'Isère, France. He participated in the creation of the National College of Interventional Radiology of which he was President from 1994 until 2002. A Founding Member of the World Federation of Interventional and Therapeutic Neuroradiology (WFITN), he was the President from 1993 until 1995.

With the expansion of his clinical and administrative responsibilities, he has dedicated himself to the development of Neuroradiology as a specialty. He was a Founding Member of the European Society of Neuroradiology (ESNR) and of the French Society of Neuroradiology (SFNR), the latter being founded later in 197O. After serving as General Secretary for a period of twelve years, he was elected President of the French Society of Neuroradiology in 1989. A Founding Member of the *Journal de Neuroradiologie* (now known as *Journal of Neuroradiology*) in 1974, he became its Chief Editor from 1978 until 2002.

All this allowed him to create in Nancy a School of Neuroradiology specially oriented towards Interventional Neuroradiology and Neuroanatomy. He has trained many doctors from many countries in Diagnostic and Interventional Neuroradiology. As a tribute to his vast experience, he is frequently invited to different countries where he has given more than 400 guest lectures all over the world. His publications in diagnostic and therapeutic neuroradiology number over 500. He has organized many meetings and particularly the XVII Symposium Neuroradiologicum – World Congress of Neuroradiology, held in Paris 2002.

In 2002 was awarded the prestigious *Chevalier de la Légion d'Honneur*. Elected Vice-President of the World Federation of Neuroradiological Societies in 2002, at the present time, as President of the WFNRS, he devotes his efforts to organizing Diagnostic and Interventional Neuroradiology throughout the world and to the education and training of neuroradiologists

and to the ethical problems that this activity has to face.

Prof Picard has devoted his life and professional career to the clinical development of Neuroradiology, the Radiology of the Central Nervous System, and to his pivotal role in the heart of Neurosciences, with a vision of interdisciplinary, but unitary, approach to our patients.

Honoris CAUSA Award Ceremony
Bologna 21/04/2010

Acceptance Speech by Professor Luc PICARD

Rector, Dean of the Medical Faculty, Colleagues and Friends.

First of all, let me warmly thank all those who were instrumental to my receiving this honour today, in particular Professor Ivano Dionigi, Rector of the Alma Mater University of Bologna and Professor Sergio Stefoni, Dean of Bologna's Medical Faculty.

I speak to you today with much emotion and immense gratitude. My ties with the University of Bologna go back a long way to the Seventies. The Neuroradiology Department of Bellaria Hospital was then headed by Professor Giovanni Ruggiero, an eminent neuroradiologist of world renown. After many professional meetings, Professor Ruggiero and I became friends: I would call him jokingly the "Pope of Neuroradiology" and he in turn nicknamed me the "D'Artagnan of Neuroradiology". The professor had ties of friendship with several French neurosurgeons and neuroradologists as he had spent several years in Paris at Saint Anne on Professor Marcel David's team. It was only natural therefore that when I started developing interventional neuroradiology in Nancy supported by the head of Nancy's Neurosurgery Department, Professor Jean Lepoire, Professor Ruggiero was to send me many of his students to get hands-on experience in this new clinical side of neuroradiology. It was during this period that he invited me to Bologna to treat a patient with post-traumatic carotid cavernous fistula using endovascular embolization. That first operation in Bologna was an unforgettable experience. On arrival, I found the anaesthetists were on strike, and so had to devise my own makeshift sedation, which didn't simplify matters! The patient recovered, however, without sequelae and the collaboration between the Ruggiero and me flourished. That was how I became involved in the Italian society of Neuroradiology, which led to my being made an Honorary Member a few years ago. I still have the honour of collaborating very closely with my friend Professor Marco Leonardi in the framework of the European Society of Neuroradiology (ESNR), the World Federation of Neuroradiological Societies, the World Federation of Therapeutic and Interventional Neuroradiology (WFITN) and the World Neuroradiology Symposium, to be held here in Bologna in a few months' time under his presidency. May I say publicly how much I admire him and treasure his friendship. Finally, although I cannot name them all, I would like to greet all my Italian colleagues and friends, especially my former students.

Today, in the light of fifty years' experience in neuroradiology, I would like to outline the mighty challenges our speciality will have to tackle in the 21st century if it is to maintain, and indeed develop, the human dimension that has always distinguished our discipline. To understand the current situation we should briefly review the extraordinarily rapid development of the technology. Neuroradiology took off a couple of decades after the discovery of X rays by Roentgen in 1895. In the beginning, study was confined to the body's bony casings: the skull and the spine. Following the arrival of contrast medium, fractionated gaseous encephalography allowed us to attempt diagnosis of intracerebral lesions using a system of "Chinese shadows". After that, iodinated contrast media made possible myeloventriculography followed by angiography, which, as radiological resolution improved, meant being able to study ever-smaller elements. In the Sixties, angiography led to the development of interventional neuroradiology. This was rapidly followed by the revolution heralded by cross-sectional imaging. The first clinical scanners made their appearance in 1974. With the arrival of magnetic resonance imaging, the decades that followed took us to the limits of morphology. Non-invasive in vivo cross-sectional imaging provides as much information as the best anatomical sections using standing viewing techniques. Tractography allows us even to access transmission paths, in other words, the body's main nervous connections, albeit using statistical data-acquisition methods.

Given these achievements we now have to decide what research avenues should be developed. Generally we will obviously continue to seek out ever-smaller elements. Spectroscopy is a good example of this. We are, however, far from 100% reliability. Which is why we have to determine what avenues of research will allow us to make real progress in diagnostics and therapy. To do this we must first of all ask ourselves the following questions:

1. What would we like to know more about, and for what end?
2. What methods will allow us to progress?
3. Will ethical issues constrain us or will they direct our progress?

1. *What would we like to know more about, and for what end?*

This issue is well illustrated by a few examples. First: accurate diagnosis of brain gliomas. MRI has allowed us to take giant steps but still today ours is only a tentative approach with 60-70% reliability in the best of cases. We had hoped that spectroscopy would bring us close to

the 100% goal. The fact is, however, that spectroscopy gives only a little more information, with the result that still today only biopsy – and we know how invasive and risky that is – can provide precise, unequivocal diagnosis. Hope does lie in "multi-modal techniques under truly stereotactic conditions". This should allow us to collate a maximum amount of information from different sources deriving from very small volumes (pixels?). It is very likely, however, even this will not answer all our questions.

The second example is closely linked to interventional neuroradiology. The ever-widening use of "cross-sectional brain imaging" has led to increasingly frequent accidental diagnosis of aneurysm before rupture. Yet current treatment, practically exclusively using mechanical devices (neurosurgical clipping during open brain surgery, endovascular occlusion with coils, flow-altering stents or combinations of these), entails undoubted, often severe, risks. Aneurysm is a "disease" of the arterial wall, an organ we are totally unable to study in vivo. An understanding of this wall would allow us to better understand and classify the mechanisms of rupture and develop a better set of indications.

Yet one thing, however, must not be forgotten: however detailed our understanding of the components of a given structure, we still do not have all the information we need. We have to know more of the relations and interactions between these different structures - even to the point of glimpsing what "creates life". We are only now beginning to understand that the host of a disease - the patient - plays a key role in the development of that disease. This applies to tumours where "tailor-made" chemotherapy for the individual host is now being used. It is also pertinent to arteriovenous malformations. An arteriovenous malformation, which we know has its own molecular biology, develops in the brain of a patient with his or her own particular molecular biology. This is tantamount to saying that two completely identical arteriovenous malformations will require different, patient-specific treatments.

2. What methods will allow us to make progress?

It may well be that the continual gains in image resolution and hence in accurate information will help us. However, we are progressively leaving the field of the visible. This means we will have to "invent visualization methods" to see what cannot be seen on a morphologic image. Associating the information provided by spectroscopic graphs with morphological imaging will, however, require "cerebral gymnastics" – something that will not make our task any easier.

Nanotechnologies will certainly have many applications, exploiting biological phenomena to provide highly accurate insights into infinitely small structures. This will reduce the need for super-selective catheterization, even if with ultra-small catheters, in favour of remote injection of drugs that will "navigate" their way to their designated target.

We must, however, limit our crystal ball gazing since increasingly, medical progress will ride on the back of general scientific progress. Cross-sectional imaging, for example, came about thanks to the invention of computer processing, which in turn was driven by the world wars and unimaginable at the beginning of the 20th century.

It has become evident that since morphological imaging became 3D, it is as precise as the best anatomical sections and will increasingly be the framework for the study of "invisible" structures using stereotactic and multi-modal methods. But we will have to invent either images or some other form of representation allowing us to analyse, understand and compare these elements.

The many developments ongoing will require continual training that will have to be as in-depth as it is frequent. This must be accompanied by continual re-assessment of practitioner skills, meaning that our qualifications will no longer be for life. There is a real revolution on the way.

3. The most exciting issue is the ethical questions we will have to face as we consider the future.

Functional imaging poses the most complex issues. It forces us to go beyond the confines of medicine proper and consider the imponderable questions regarding our human condition. We have known for many years that all brain activity is accompanied by multiple flow transmissions. First studied with the electroencephalogram, researchers made no claim, however, they were investigating "thought". Current functional imaging is based on the study of oxygen consumption. This gives us an idea of the amount of activity going on in a given cortical area, frequently considered the area of the brain's functional centres. However, great care must be exercised when "interpreting" these findings. Even if Charcot's anatomopathology studies showed the importance of the areas of Broca and Wernicke for language and verbal understanding, we now know that language depends on many complex circuits each of which are indispensable for normal functioning. We must also be aware that the idea of "eloquent areas" widely used in the 20th century implied that part of the brain "had no use". It was this mistaken theory that condoned lobotomies, amputating so many "patients" of much of their personality. Knowing that every part of the brain has a use means being aware that our current-day investigations of cognitive functions are coarse in the extreme: that we have to hone our interventions on the brain and develop methods that will preserve any part of it we examine.

I would like to sketch out the issue of the ethical limits that accompany technical progress using a few examples.

When Tibetan monks agreed to undergo functional MRI tests while at prayer, the circuits that were obviously found activated were quickly dubbed as "the circuits of spirituality". There isn't much difference between the claim that these are circuits were planted in the human brain by God and the theories defended by today's "*Neurotheologists*". Transcendence has entered the scene of scientific logic. But that's fair enough: it is all part of the debate!

Equally important if not more so are the *legal implications* of these findings, the extent of which we are only just beginning to appreciate. We know that the brain and its gyri are a major focus for all those concerned with biometrics. Analyzing the cerebral cortex would be an excellent means of "characterizing" an individual. But we should also be aware that already in the 21st century, a person has been condemned in a court of law in the wake of a highly questionable interpretation of functional RMI imaging. On hearing the description of the circumstances under which a particular crime was committed, the accused evidenced circuit activation that was considered to "prove" he already knew those circumstances and had experienced them. It was on this basis that the Jury found him guilty. One can well imagine the risks such thinking could entail. They recall the worst excesses of phrenology.

The concept of the normal brain must also be reviewed. We live in a society governed by standards that are often established on the basis of statistics. Technology allows us to explore in-depth the brain of a foetus during inter-uterine life. This consequently obliges us to consider what are "normal" acceptable limits beyond which therapeutic termination of pregnancy should be recommended. Yet apart from extreme cases, these decisions are difficult and always delicate.

Closer to our daily clinical practice, we see how the very concept of the "*diagnosis of consciousness*" is changing. Over recent decades, neuroradiologists have been able to diagnose brain death, acknowledging the arrest of brain circulation as an irreversible condition. But what about "vegetative states"? In recent months, the media have got hold of work by Belgian and British groups (Steven Laureys et al.) showing that as well as the vegetative state, we should perhaps also define "a state of minimum consciousness". These studies claim that even in the absence of detectable clinical reaction by classical patient-stimulation methods, functional MRI has disclosed repeated reproducible responses in the form of signal modifications triggered by certain oral or visual questions or stimuli. Were infra-clinical coordinated reproducible brain reactions to be found, it would prove that some sort of consciousness – or bouts of consciousness – persists. Even if for the moment this does not afford any hope of feasible patient recovery, these techniques may nonetheless allow us to understand whether the patient needs pain-killers or not. When it comes to these broad human issues, however, the more accurate our scientific instruments become, affording clearer and surer theoretical understanding, the more that line on the horizon becomes blurred, and new dilemmas appear.

Conclusions

Everything I have said points to the fact that an increasingly refined knowledge of infinitely detailed elements obliges us to ask many questions about human thought, religions, and what some call the soul. This gives us a glimpse of the hugely complex tasks that lie ahead and the weight of responsibility that awaits us. This, in turn, will lead us to reassess how we exercise our profession and how we train our students.

While neuroradiology has yet to be fully characterized in detail, our disciple is already being broken down into sub-specialities – interventional neuroradiology, functional imaging, paediatric neuroradiology, etc. But basic training is still confined within the straitjacket of specialities created almost a century ago, be they radiology, neurology or neurosurgery. This organisational structure is clearly no longer in keeping with the situation today. The solution lies in adopting the much wider framework of the neurosciences. Ideally, training must include not just anatomic and clinical study of the normal and pathological nervous system in all its aspects but also cognitive sciences, anatomopathology, genetics, molecular biology, intensive care, and of course, all available imaging techniques. It is only with this sort of broad palette of competences that future specialists will be able to acquire additional skills appropriate to their practice. This obviously requires that bridges be built between the various specialities.

The way we practice our profession will change considerably as well. Insufficient numbers of specialists will oblige us to go increasingly in the direction of distance medicine, which only widens the gulf between neuroradiology and patients. Dealing with emergencies will require the use of remote intervention techniques, an area that will doubtless develop apace. All this means solving the liability issues these new techniques will generate. But the essential – and probably most difficult – area will be not only to maintain but also to develop the human qualities of our future specialists. More than ever, these specialists must be trained to behave as real clinicians able to work as part of multi-disciplinary teams. They must be close to their patients, before whom they will have to assume an increasingly broad range of responsibilities whose consequences will embrace not only conditions of disease but also prevention and the physiological functioning of the brain during everyday life.

Thank you for your attention.

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