

**International Day of Radiology 2015
Interview on paediatric imaging
France / Prof. Hubert Ducou Le Pointe**



**INTERNATIONAL
DAY OF
RADIOLOGY**

AN INITIATIVE OF THE ESR, ACR AND RSNA

Paediatric imaging in France

An interview with Hubert Ducou Le Pointe, professor and Chief of the Department of Radiology at Armand Trousseau Children's Hospital in Paris, and president of the Francophone Society of Paediatric and Prenatal Imaging.

European Society of Radiology: What is paediatric imaging? What age are the patients, and how is it different from regular imaging?

Hubert Ducou Le Pointe: Paediatric imaging is a radiological subspecialty. In the European Union, children are defined as human beings whose ages range from birth to 18. However, in current practice, paediatric radiology also involves imaging of foetuses and young adults. Indeed, patients presenting with a rare disease should preferably be followed by the physicians who have known them since childhood. These young adults progressively move to adult medicine in the absence of acute exacerbation of their disease. Some paediatric radiologists are involved in prenatal imaging due to their knowledge of malformations in new-born infants and their level of expertise in ultrasound. Modern imaging techniques such as magnetic resonance imaging (MRI) are also used to examine foetuses. Paediatric radiology differs from regular imaging in the way examinations are performed; imaging children requires constant dialogue between the child, the parents and the practitioner. Moreover, for patients under three years of age, proper immobilisation techniques and sedation may be required in order to obtain good quality images and to avoid repeating examinations. The procedure is monitored by a senior radiologist, who may answer the clinician's specific questions and take radiation considerations into account.

ESR: Since when has paediatric imaging been a specialty in its own right?

HDLP: The publication of John Caffey's textbook *Pediatric X-Ray Diagnosis* in 1945 is in my opinion the starting point of our subspecialty. In 1958 the Society for Pediatric Radiology was founded in the United States. Ten years earlier, the French radiologist Jacques Lefèbvre became head of the radiology department of the Sick Children Necker Hospital. In 1957, upon returning from a visiting programme in New York, Boston and Montreal, he organised a day dedicated to paediatric radiology during the French radiology congress. In 1963, together with J. Sauvegrain and C.I. Fauré, he organised the international meeting of paediatric radiology in Paris. The European Society of Paediatric Radiology was created during this congress.

ESR: Which imaging modalities are usually used to examine paediatric patients? Does this change depending on the age of the patient?

HDLP: All techniques are used to examine paediatric patients. Conventional radiographic examination still remains an integral part of paediatric radiology, but ultrasonography is the technique of choice for imaging the paediatric population. It is a non-invasive technique, which does not use ionising radiation. Ultrasonography is the primary technique used to explore the abdomen in paediatric patients, and is widely used to explore the neonatal brain and evaluate the musculoskeletal system. Despite the fact that MRI requires sedation for children under the age of four, it is the best technique for neurological and musculoskeletal imaging in paediatric patients. Abdominal and thoracic MRI indications are also increasing. Computed tomography (CT) remains mandatory for imaging lung diseases and the inner ear, and it is the best modality in emergency cases.

ESR: Some imaging techniques, like x-ray and CT, use ionising radiation. What risk does this radiation pose to paediatric patients? What kind of safety measures are in place to protect children?

HDLP: First, one must remember that CT is a valuable lifesaving tool. The individual risk of a justified CT exam is quite small compared to the benefit of accurate diagnosis and treatment. There is a debate in the literature concerning the risk estimates for low levels of radiation exposure (under 100 mSv). However, everyone agrees that children are more sensitive than adults to the stochastic risks of radiation. Their longer remaining life expectancy also increases the risk of developing cancer. Recent epidemiologic studies have found an association between CT exposure during childhood and risk of cancer. These results are not admitted by the recent report on children by the United Nations Scientific Committee on the Effects of Atomic Radiation.

Nevertheless, we have to minimise radiation exposure by avoiding unnecessary CT scans and using the minimal dose necessary to achieve a quality diagnostic image. In Europe, the new Council Directive 2013/59 Euratom emphasises the need for justification and optimisation of medical exposure. Many European countries have implemented national requirements in line with this directive. The French Society of Radiology has established the Radiation Safety Working Group to promote medical radiation protection in France. The group's main activities focus on publishing guidelines, advanced professional training, clinical audit, and patient information. The Francophone Society of Paediatric and Prenatal Imaging actively participates in this group and in dedicated groups of the European Society of Radiology (ESR) and European Society of Paediatric Imaging. The ESR launched the *EuroSafe Imaging* campaign and is involved in a number of European Commission projects, one of which concerns the establishment of diagnostic reference levels for paediatric imaging.

All these actions improve patient safety in daily practice. For example, in my department, a radiologist checks if CT requests are justified. Medical acquisition protocols have been developed with medical physicists in order to obtain diagnostic images with the lowest possible dose. Protocols depend on the anatomical region and the patient's age and weight. The latest dose reduction CT technology such as iterative reconstruction can also be applied.

ESR: Do general radiologists always use lower radiation doses when imaging children; are there any guidelines to follow?

HDLP: I hope so! In France, according to the Radioprotection and Nuclear Safety Institute, CT examinations are rather rare; only about 2% of all ionising exams are performed on paediatric patients. Infants and preschool children are examined in departments that are able to provide sedation and radiologists in those departments are very concerned with radiation protection. CT exams in children and teenagers are more frequently performed in general radiology departments. As previously mentioned, European and national guidelines are published to help general radiologists to perform appropriate exams. The French Nuclear Authority conducts about 100 inspections of computed tomography facilities each year. They assess radiation protection of workers and patients, and inspect the paediatric protocols. In my opinion, we are on the right track.

ESR: How aware are parents and relatives about the risks of radiation exposure? How do you address the issue with them?

HDLP: There are many sources of information about the risk of radiation exposure. The French Society of Radiology provides clear information for patients on its website regarding potential risks and expected benefits of ionising radiation procedures. Together with the Francophone Society of Paediatric and Prenatal Imaging, it has been involved in the development of a patient information leaflet including specific information on radiation protection. In addition to these sources of information, radiologists and technicians who perform the exams are available to discuss this topic with parents.

ESR: Undergoing an imaging examination, especially a long procedure like MRI, can be an uncomfortable and sometimes frightening experience for some children. How can it be made more bearable?

HDLP: Performing a long procedure is a real challenge. Parents are very helpful in reassuring children. Technicians are very experienced and know how to talk to children and boost their confidence. Children are offered the option of listening to music of their choice, which is a good way of relaxing. If the cost is reasonable, allowing children to watch movies may also be helpful.

ESR: Access to modern imaging equipment is important for paediatric imaging. Are hospitals in France equipped to provide the necessary exams?

HDLP: It is now well known that France is lagging behind many other European countries regarding MR equipment. It is a real problem for paediatric care and radiation protection of these patients. The second major problem is the dramatic lack of paediatric radiologists all over the world. All residents are trained to perform paediatric exams but our subspecialty is considered to be difficult and non-lucrative in a private practice. Despite paediatric imaging being more time consuming, there is no compensation in terms of income for paediatric MR procedures. This is simply unfair.

ESR: What has changed in paediatric radiology during your lifetime?

HDLP: My generation began training with all the currently available techniques but these techniques have improved significantly. They allow faster and better quality images to be obtained. The most significant changes concern the child's well-being during the procedure. Teams involved in paediatric imaging are mostly concerned with soothing the children's pain and fear.

ESR: Where do you see the next developments in your field?

HDLP: Technical advances will continue for sure. Concerning CT, photon-counting detectors are known for their ability to deliver spectral information. Several studies offer hope of a significant dose reduction using such a technology. Concerning MRI, nowadays, lung imaging is no longer a fantasy; lots of studies have been dedicated to this topic. Due to insufficient spatial resolution, cost and long acquisition time, foetal MR imaging actually has very limited indications in this field, but what about the future? Undoubtedly, functional and molecular imaging will also progress. All these techniques promise an exciting future.



***Hubert Ducou Le Pointe** is Chief of the Department of Radiology at the Armand Trousseau Hospital in Paris. He is also Professor of Radiology at Trousseau Hospital Saint-Antoine School of Medicine in Paris. He has sat on the editorial board of several journals, including Pediatric Radiology and the French-speaking publications Radiology Journal and Paediatric Archives.*

Prof. Ducou Le Pointe is the President of the Radiation Protection Committee of the French Society of Radiology, President of the Francophone Society of Paediatric and Prenatal Imaging and a member of the Radiation Protection Committee of the European Society of Radiology.

He has published 69 papers in English and 71 in French, and has given or authored over 270 talks and communications.