

**International Day of Radiology 2015  
Interview on paediatric imaging  
Czech Republic / Prof. Martin Kyncl**



**INTERNATIONAL  
DAY OF  
RADIOLOGY**  
AN INITIATIVE OF THE ESR, ACR AND RSNA

**Paediatric imaging in the Czech Republic**

**An interview with Martin Kyncl, senior consultant in paediatric radiology at the University Hospital in Motol, second Medical Faculty of Charles University in Prague.**

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

**Martin Kyncl:** Paediatric imaging involves the imaging of foetuses, infants, children, adolescents and young adults. The specialty has to take into account a wide range of diagnostics applied to patients ranging from preterm infants to adolescents. There are many conditions that are only seen in infants and not in adults. To diagnose a paediatric condition, high quality images are required. Young patients differ significantly in many respects from adult ones. Child-doctor relationships and interaction require an entirely different psychological approach and assertive communication. Also, the dimensions of organs are smaller than in adults and tissues are immature and still developing. Great emphasis must be put on achieving a sufficient quality of diagnostic imaging and on the customisation of the examination with respect to the specific requirements of child patients.

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

**MK:** The speed with which the discovery of x-rays was applied and spread in human medicine is fascinating. Let me focus on the creation and development of paediatric radiology in our country. In 1897, surgeon Rudolf Jedlička from the Prague Surgical Clinic of Professor Maydl started x-ray examinations of paediatric patients and published the first individual case studies in the *Journal of Czech Physicians*, namely a fracture of the right radius in an 11-year-old boy who fell from a window on the 2<sup>nd</sup> floor, and pleural effusion in lung metastasis of femur osteosarcoma in a 15-year-old girl. In 1902 'The First Czech Children's Hospital of Emperor and King Franz Joseph I' was opened. The mission of this hospital was linked to the development of diagnostic imaging in children, especially with x-ray diagnostics. The x-ray diagnostics of childhood diseases was further elaborated on and developed mainly by Professor Josef Houštěk, Dean of the School of Paediatrics, which was founded in 1953 in Prague. In response to the recommendations of the European Parliament and Council Directive 2001/19/EC of 14 May 2001, paediatric radiology in the Czech Republic became an independent specialised branch of the medical profession.

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

**MK:** It is important to set the exact investigation protocol to ensure the maximum possible reduction of the dose of ionising radiation, while adapting to allow for motion artefacts and the small size of the patient's organs. Naturally, protocols differ according to patient age. A number of paediatric examinations require general anaesthesia, which should also be taken into account when referring patients for examinations.

We always choose diagnostic methods with little or no ionising radiation. The spectrum of indications is currently shifting primarily to ultrasound (US) and magnetic resonance imaging (MRI).

Paediatric diagnostics includes a wide range of diagnostic imaging from pre and perinatal examinations to the assessment of birth injuries, as well as numerous specialised neurological and neurosurgical examinations. A truly specific feature of paediatric radiology is the diagnosis of congenital tumours and haemoblastoses, as well as the increasing number of cancers in younger and older children. Along with the growing success of cancer treatment, paediatric radiologists are more

and more frequently confronted with secondary malignancies in patients who have not yet reached adulthood. It is in this context that the dose of ionising radiation must be reduced as much as possible during diagnostic examinations.

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

**MK:** Children are more radiosensitive than adults. They also have a longer remaining life expectancy over which they may develop cancer from exposure to ionising radiation. The paediatric radiology and medical communities have developed radiation protection policies and practices that reflect this concern. Therefore, it is essential that examinations in children are performed on specially configured radiological devices, in order to maintain the parameters of the lowest possible radiation dose, according to the ALARA (As Low As Reasonably Achievable) principle. CT examinations are conducted mainly as low dose ones. Special equipment and setup of sequences is also required for MRI units. In cases of complicated procedures and examinations, it is appropriate to seek assistance from paediatric centres dealing with specific issues.

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

**MK:** The aim is that every hospital in the country with a general radiology department has a paediatric radiologist to ensure the best possible diagnostic imaging in children, or has a consulting physician or paediatric radiologist in a tertiary or teaching hospital. The goal within paediatric radiology in the Czech Republic is to ensure optimal staffing, equipment and economic conditions to ensure adequate diagnostic and imaging capacities in every radiodiagnostic department, keeping the above-mentioned specifics of paediatric radiology in mind. In my opinion, it is appropriate and advisable to cooperate with the *Alliance for Radiation Safety in Paediatric Imaging*, whose information and educational materials are freely available.

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

**MK:** Thanks to modern communications technology and the availability of information, parents' awareness is rising. It is also possible to share information with parents who already have experience with diagnostic imaging. For instance, we use our hospital website to provide information about diagnostic procedures as well as possible health risks associated with the different types of imaging. We publish printed material and leaflets with information on specific examinations (such as micturating cystourethrography and CT) that are available from the department of the physician who prescribes a certain examination. We also try to raise public awareness of diagnostic imaging by giving public lectures and popularisation programmes in the media.

**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?**

**MK:** To successfully diagnose a paediatric condition, high-quality images are absolutely essential. One of the preconditions for obtaining top-quality images is the creation of an environment where a child feels comfortable. This is one of several important elements of paediatric radiology. The imaging departments that specialise in paediatric radiology can have their rooms tailored to suit a child's needs. Waiting and examination rooms are equipped with a variety of toys, decorations and picture books. In cooperation with psychologists, we have implemented a motivating system for little patients. We present an examination as a story, or a tale, in which a diagnostic procedure has a role. Another approach that has proved successful is inviting a child and the parents to first come to the examination room for a kind of visit. During this visit, they can touch the unit and learn about the environment before undergoing the diagnostic imaging proper.

**ESR: How many imaging exams are performed on paediatric patients in the Czech Republic each year?**

**MK:** Our Department of Imaging Methods at the teaching hospital in Motol, 2<sup>nd</sup> School of Medicine of Charles University, provides about 12,000 paediatric ultrasound examinations per year, 1,200 CT and 3,300 MRI paediatric examinations per year, and examines about approximately 27 MRI paediatric patients per week under general anaesthesia. Every year there are nearly 20,000 outpatient paediatric x-ray examinations performed.

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

**MK:** All teaching hospitals and tertiary hospitals in the Czech Republic are equipped with very modern diagnostic equipment, which is adjustable for paediatric protocols. We follow the latest trends in imaging. The leading role in this process is played by the largest paediatric hospital in the Czech Republic, which is the Teaching Hospital in Motol, Prague. In general, the quality of equipment in our hospitals and medical facilities is good and can provide adequate services for child patients.

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

**MK:** I have seen major changes in imaging equipment and in the recent development of hybrid methods such as PET/MRI, functional MRI and various image fusions. What has also changed is the perception of paediatric diagnosis from the standpoint of minimum invasiveness and reduced ionising radiation. Children and parents are partners in diagnostic imaging. Together, we try to go through often uncomfortable procedures. In diagnostic imaging, especially in paediatric radiology, even with the best equipment and facilities at our disposal, we must not forget the patients themselves, their comfort and convenience.

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

**MK:** I believe that the future of paediatric radiology and imaging in general lies in imaging on the cellular and molecular level, in being able to diagnose diseases before they fully develop, and in cooperation between imaging and other clinical and research fields. General radiologists and paediatric radiologists must be part of research teams and continue to help develop diagnostic imaging as part of a mosaic of professions on the way to improving health. I think that those who are involved with paediatric radiology and imaging have quite an interesting and exciting future ahead of them.



**Martin Kyncl** is a senior consultant in paediatric radiology at the University Hospital in Motol, second Medical Faculty of Charles University in Prague, and at Norrlands University Hospital in Umeå, Sweden. He is responsible for the Research Project of the Faculty Hospital in Motol, where he also is a college tutor. He has also been a tutor for the European School of Radiology (ESOR) since 2012.

Dr. Kyncl obtained two postgraduate degrees in radiology at the Postgraduate School of Medicine, Prague, and did a fellowship in general radiology and neuroradiology at the American Hospital of Paris and Teaching Hospital Necker Paris in France in 1997. He is currently doing a postgraduate doctoral study in imaging methods.

He has published four chapters in monographs and 85 journal articles. He is a member of the neuroradiology section of the Swedish Radiology Society, the Czech Neuroradiology Society and the European Society for Magnetic Resonance in Medicine and Biology.