

International Day of Radiology 2015
Interview on paediatric imaging
Serbia / Dr. Polina Pavićević



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DAY OF
RADIOLOGY**
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Paediatric imaging in Serbia

An interview with Polina Pavićević, staff radiologist at the University Children's Hospital in Belgrade and assistant professor of radiology at the Faculty of Medicine, University of Belgrade.

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

Polina Pavićević: Paediatric radiology is a subspecialty of radiology involving the imaging of fetuses, infants, children, adolescents, and young adults. Many paediatric radiologists practice at children's hospitals. The subspecialty focuses primarily on age-related rather than modality or organ system-related imaging. Children are a unique patient population, because they are often difficult to communicate with and are undergoing constant growth. The paediatric radiologist must be comfortable taking care of children and familiar with their diseases.

Three aspects of paediatric radiology differentiate it from other imaging subspecialties. First, working with paediatric colleagues as part of a team makes for a pleasant work environment. It takes a special person to devote his or her life to the care of children, and it is rare to find a paediatric clinical colleague with a disagreeable personality. Second, most paediatric radiologists today work as total-body imagers, taking care of all kinds of children's imaging within their department, regardless of the modality or organ system that is involved. Imaging turf battles are uncommon. Third, and most important, working with a paediatric patient population never fails to bring a smile during the day's encounters with children and families. The chance to help heal a child is truly a way to improve our collective futures.

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

PP: The paediatric radiology era begins with John Patrick Caffey, who was born in 1895, the year of Roentgen's discovery of x-rays. Caffey's academic career in paediatrics was well underway at New York's Babies Hospital when, in 1929, he was abruptly assigned to take charge of radiology as the hospital's first in-house radiologist (although the position was actually called 'roentgenologist'). In 1945, the first edition of *Pediatric X-ray Diagnosis* was a major step toward establishing paediatric radiology as a discipline within paediatrics (as Dr. Caffey probably expected) and radiology. In September 29, 1958, a meeting in the Shoreham Hotel in Washington, DC, was the first annual meeting of the Society for Paediatric Radiology (SPR). Thirty-three physicians signed the attendance sheet, including eleven who later became presidents of the society. There was one woman in the group. The majority of them were radiologists, but some had been trained wholly in paediatrics; the motions passed at the meeting did not include any requirement for formal radiological training. It was decided that the society would meet in conjunction with the American Roentgen Ray Society. Dr. Neuhauser was elected president, and Dr. Silverman was named president-elect, not only because of his outstanding qualifications but also his close ties to Dr. Caffey, who was not present. The scientific part of the meeting consisted mostly of interesting cases shown by lanternslides or by films on view boxes. Unsigned handwritten notes in the society's archives show that Dr. Neuhauser presented data and films on infantile polycystic kidney disease and its coexistence with pulmonary hypoplasia and cystic disease of the liver. Dr. Edward Singleton showed a case of pulmonary microlithiasis in an 11-year-old child. Dr. John Kirkpatrick had brought a cine-roentgenographic strip of poor oesophageal peristalsis after repair of oesophageal atresia. There were several other presentations, the notes of some of which cannot be deciphered. Thus, radiology's first subspecialty organisation was born.

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

PP: The most frequently used imaging modalities are conventional radiography, echosonography (which has an important role in many pathological disorders in infants and children), and of course, different modalities of magnetic resonance imaging (MRI).

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?

PP: The modality that delivers the largest dose of ionising radiation is CT. Use of this modality in children has been increasing at a rapid pace. It is estimated that, since the 1980s when CT was beginning its ascendancy, there has been an 80% increase in the number of CT examinations. Two major advances have lowered the radiation dose of plain films and fluoroscopy: digital imaging and pulsed fluoroscopy. The biological effects of radiation result primarily from damage to DNA and are greatest in faster growing organisms, the foetus, infant and young child. Additionally, individuals with certain diseases are uniquely sensitive to radiation-induced cancers, although the exact mechanism remains unclear. As the existence of a threshold dose is unknown, it has been assumed that even the smallest dose involves a proportionately small risk of induction of malignancies, and it has further been assumed that the dose acts cumulatively.

Children are more radiosensitive to the induction of some, but not all, significant malignancies than adults; they have a longer remaining lifespan for the manifestation of radiation-induced malignancies to occur and they will probably undergo an increasing number of radiological examinations with an accumulation of dose. Therefore, adherence to the As Low As Reasonably Achievable (ALARA) principle remains a keystone of paediatric radiology.

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

PP: Some of the equipment adapted for use in paediatric radiology includes: artificial windows or light panels, positioning equipment such as sponges, and weights. Most equipment used is the same as in adult imaging, but using lower dose and exposure settings adapted for children.

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

PP: There is information for parents that includes basic information brochures that can be printed or downloaded, and that describe what x-rays are, what the risks and benefits are, and what can be done to decrease these risks.

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?

PP: For children under the age of five or six, we usually need some kind of sedation (analgo-sedation). In some other cases, if the procedure is not so long, parents should be present during the examination and the environment should be pleasant, with background music, DVDs, etc.

ESR: How many imaging exams are performed on paediatric patients in Serbia each year?

PP: In 2014 our hospital, which is one of two university hospitals in Serbia and has about 300 beds, seven paediatric radiologists performed about 20,000 ultrasound examinations on 8,200 patients (ultrasound of the hips, urogenital tract, abdomen, head, chest, etc.); 42,266 x-ray examinations (conventional and different contrast radiographic examinations) on 15,807 patients; 2,703 MRI examinations (for neurology, abdomen, musculoskeletal, cardiology applications, etc.) and 2,441 CT examinations.

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

PP: Our hospital has quite satisfactory equipment, which includes only one good ultrasound device – an Acuson S2000 with four probes – but the machine dates back to 2006. Our CT scanner is an MDCT 16 Siemens, also from 2006. Our MRI scanner is the youngest (2009, Achieva, Philips) and we have digital Roentgen equipment for conventional x-ray examinations. University hospitals have almost the same level of equipment.

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

PP: A lot of things have changed since I started to deal with medicine and radiology; nowadays we have a lot of opportunities for imaging, especially with paediatric ultrasonography, with its ever-increasing potential as a non-invasive and non-ionising alternative imaging modality, offering reliable and comprehensive diagnostic information, particularly for children. The second imaging tool that is rapidly changing and growing is MR imaging.

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

PP: I expect a lot of research in the field of ultrasonography (contrast-enhanced ultrasound, 3D and 4D modalities) and further development of functional MRI of different body parts.

Polina Pavićević is a staff radiologist at the University Children's Hospital in Belgrade and assistant professor of radiology at the Faculty of Medicine, University of Belgrade. Her clinical and research interests focus on abdominal and urogenital imaging, and especially MR urography of children. In 1989 she received her medical degree from the School of Medicine, University of Belgrade, where she also completed her residency in paediatrics and radiology in 2000. She received her master's and doctoral degrees from the Radiology School of Medicine, Belgrade University in 2006 and 2015.