BY KATHARINA MIEDZINSKA

PAEDIATRIC ONCOLOGIC

Experts to discuss the costs of cure for long-term survivors of childhood cancer

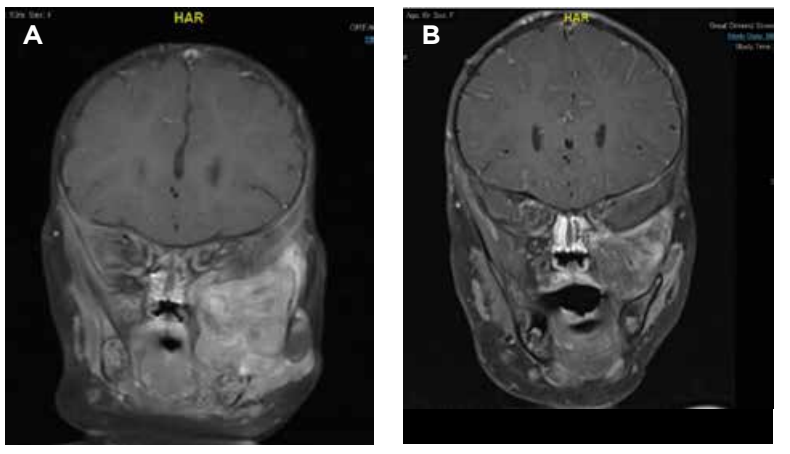
With advanced oncotherapy and better supportive care, survival for many children with cancer has improved significantly over the past few decades and today overall survival rates for childhood malignancy have reached approximately 80 percent. However, this remarkable achievement comes at a price.

Therapies responsible for improved survival are often accompanied by adverse long-term effects and health-related outcomes that can manifest months to years after completion of treatment, and represent the ultimate cost of cure for long-term cancer survivors. "The increasingly efficacious therapies available for cancer treatment have produced cohorts of children who survive their initial cancer and live to adulthood, but who at the same time have a significant chance of developing late systemic effects," said Dr. Catherine Owens, from the department of imaging, Great Ormond Street Hospital for Children NHS Trust, London, who will chair today's session.

Cancer and its treatment may result in a wide range of life-altering effects, including impaired growth and development, neurocognitive deficits, neurological diseases, cardiovascular and pulmonary problems, endocrine organ dysfunction and metabolic disorders, gastrointestinal problems, musculoskeletal disorders, psychosocial sequelae and many others. These late effects may even also include secondary malignancies and premature aging.

"Multi-organ disorders are highly prevalent among childhood cancer survivors, relating to previous surgery, chemotherapy, and radiation. The various types of therapies administered will dictate which organ systems will be affected in the longer term," said Owens. During her talk, she plans to discuss therapy-related pathologies that are sequelae of cancer treatment during childhood and possible approaches to allow early diagnoses in order to minimise long-term sequelae. She will also highlight the human cost of cancer survival and the effects on the daily lives of survivors of childhood cancer.

The main objectives of monitoring after childhood cancer are to confirm continued remission and to monitor for late effects of cancer and related therapy. "Targeted surveillance for late therapy-related complications allows their early detection and the implementation of health-preserving interventions. For radiologists involved in screening surveillance, it is fundamentally important to receive information on initial diagnosis, age at which the patient was treated, available evidence on potential chemotherapy-related organ toxicity, presence of underlying genetic conditions and other illness and treatment-related aspects," she noted.



Baby presented with swelling of the left cheek at ten months of age. MRI: Large tumour, parameningeal, localised on all imaging, FDG PET/CT negative. Biopsy February 2011: Embryonal rhabdomyosarcoma; chemotherapy as per EpSSG localised RMS 2005 protocol group E. Some response to treatment. Proton beam radiotherapy at week 13 of treatment – completed in July 2011. Continued with maintenance chemotherapy with cyclophosphamide and vinorelbine for six months. End of treatment MRI scan September 18, 2011: increase in the size of the tumour in comparison to the pre-radiotherapy scan on April 28, 2011. Short interval follow-up scan October 26, 2011: no change in size in comparison with September 18, 2011 – stable disease. Further follow up scan January 6, 2012: stable disease, no change in the appearance of the tumour.
The tumour continues to be stable. Late effects, which are a combination of the tumour effect and radiotherapy effects, with a left-sided facial hypoplasia:
1. Left unilateral hearing loss, moderate to severe, requiring hearing aid
2. Growth hormone deficiency – on replacement therapy
3. Poor vision in the left eye – reasonable vision in the right
4. Difficulties with speech
5. Difficulties with swallowing
The patient is now almost eight years post-diagnosis and has significant late effects. The patient continues to be seen in a number of clinics, including late effects, ophthalmology, audiology and plastic surgery and has a VII nerve reconstruction planned.

A: At diagnosis – 10 months of age.
B: Last surveillance scan at the age of six years.
(Provided by Dr. Catherine Owens, department of imaging, Great Ormond Street Hospital for Children NHS Trust, London)

During today's special focus session, Owens will be joined by five experts who will discuss different late or long-term effects of childhood cancer and their treatment, focusing on management from a clinical radiological perspective.

Dr. Aurelio Secinaro, from the department of imaging at the Bambino Gesù Children's Hospital in Rome, will begin the session by discussing cardiothoracic complications in childhood cancer. Following his presentation, Dr. Iris-Melanie Noebauer-Huhmann, from the clinic for radiodiagnostics at the AKH Vienna, will discuss late effects on the musculoskeletal system. She plans to illustrate methods of radiological follow-up with case studies and to present clear imaging strategies and systematic evaluation algorithms, which, according to Noebauer-Huhmann, can help radiologists to reliably assess the late post-therapeutic sequelae and to detect potential complications in survivors of childhood cancer. Also in this session, Dr. Roxana Gunny, from the department of neuroradiology at St. George's Hospital in London, will pursue the question of how brain development may be affected by central nervous system malignancies and therapies used to treat them.

Last but not least, Dr. Laurence Rocher from the department of radiology, Hôpital Du Kremlin-Bicêtre, and Dr. Claire Berger, from the paediatric haematology and oncology department at CHU Saint-Etienne, France, will speak about fertility issues, focusing on the potential effects that chemotherapy has on fertility in males and females, and the question of how radiology can help with diagnosis and monitoring of potential therapies.

Many survivors of childhood cancer go on to have children. However, infertility remains one of the most common life-altering treatment effects experienced by long-term childhood survivors, which is not surprising, as gonadal injury is a well-established consequence of cytotoxic chemotherapy and radiation therapy. Due to the nature of the treatment they receive, some childhood cancer survivors are at high risk of infertility. Additionally, sex, age at treatment, and genetic factors influence the risk of permanent infertility.

Berger: "In women, decreased fecundity is a late effect that arises after chemo or radiotherapy. It has been shown that pregnancy is less likely to occur in survivors who have received hypothalamic/pituitary radiation, ovarian/uterine radiation, or treatment with high doses of alkylating agents. Furthermore, the number of eggs in their ovaries may be reduced to such an extent that they will reach menopause much earlier than the average age of 51 years. In males, these treatments may damage spermatogenesis, leading to impaired fertility." According to Berger, all patients deserve an informed consultation about their potential fertility and methods for fertility preservation before treatment.

"In pre-pubertal children, testicular or ovarian tissue cryopreservation may be performed, whereby results are more promising in girls than in boys. Regarding post-pubertal children, oocyte cryopreservation is preferred in girls, while sperm conservation is the simplest method in boys," said Rocher. "In men, reduced testicular volume with coarse or striated or even nodular (because of Leydig cell hyperplasia) echo texture may be shown in ultrasound. First of all, colour Doppler should be performed as usual to find other, or associated, or curable causes of infertility like varicocele or epididymal occlusion. In women, fertility imaging screening should be conducted as for any other infertile woman, especially if the chemotherapy type or dose is not consistent with the infertility status. It is important that the presence of the ovaries is assessed, as well as their volume and egg count," she added.

Today's session will close with a panel discussion addressing the question of how paediatric radiologists may recognise, monitor, and help to minimise the late effects in survivors of childhood cancer.

Special Focus Session

Sunday, March 3, 08:30–10:00, Studio 2019
SF 17 Late effects in survivors of childhood cancer

- **Chairperson's introduction**
  C. Owens; London/UK
- **Cardiothoracic complications**
  A. Secinaro; Rome/IT
- **MSK**
  I.-M. Noebauer-Huhmann; Vienna/AT
- **Neuro**
  R. Gunny; London/UK
- **Fertility issues: male and female**
  L. Rocher; Le Kremlin-Bicetre/FR
  C. Berger; Saint-Etienne/FR
- **Panel discussion: How may paediatric radiologists recognise, monitor and help to minimise the late effects in survivors of childhood cancer?**

Dr. Owens wishes to acknowledge the following colleagues for their assistance with this article: Dr. Vesna Pavasovic, Consultant Haematologist Great Ormond Street Hospital (GOSH), London, UK; Dr. Olga Slater, Consultant Oncologist at GOSH, London; and Professor Roderick Skinner, Consultant in Paediatric and Adolescent Oncology/BMT and Honorary Professor of Childhood Cancer, Department of Paediatric and Adolescent Haematology and Oncology, Great North Children's Hospital, Royal Victoria Infirmary, Newcastle upon Tyne, UK.