SIOP Europe
the European Society for Paediatric Oncology

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EUROPEAN TRAINING PROGRAMME IN PAEDIATRIC HAEMATOLOGY AND ONCOLOGY

2-Year Training Programme

European Training Programme in Paediatric Haematology and Oncology

Contents

Background

The syllabus is a comprehensive document detailing the SIOP-E endorsed training programme that provides the recommended essential training requirements for trainees in paediatric haematology and oncology to be delivered in a 2-year modular training programme with an optional third year possible.

The 2-year programme includes both haematological malignancies and solid tumors. Non-malignant conditions such as coagulation disorders and haemoglobinopathies/anaemias are excluded and will be covered by the European Haematology Association (Scientific group: Paediatric Haematology).

The training program has been designed in a modular fashion. The modules contain core knowledge and practical aspects related to a diagnostic and therapeutic approach which are essential for all trainees in paediatric haematology and oncology. Expertise in practical procedures is also required, specifically concerning lumbar punctures, bone marrow aspirations, bone marrow biopsies and skin biopsies. More specific aspects concerning diagnosis, disease-related treatment and follow-up are also specified within the programme. In addition, the trainee is also expected to be familiar with research methodologies and ethical issues pertaining to research and clinical management.

Finally, based on final career intentions of the trainees, it may be advisable to spend an additional year for more specific training in haematological malignancies, solid tumours or central nervous system (CNS) tumours.

The final goal is to ensure a standard training program throughout Europe, allowing the specialists in paediatric haematology and oncology to exercise their skills in a specialised tertiary care unit.

Update March 2020

This document is an update, coordinated by **Andishe Attarbaschi, SIOP Europe Board Member**, of the 2-YEAR TRAINING PROGRAMME IN PAEDIATRIC HAEMATOLOGY and ONCOLOGY originally developed in March 2013 by Riccardo Riccardi, former Chairman, SIOP Europe Education and Training Committee, as part of the ENCCA Project, WP15 Education and Training.

Module 1: Learning Points

- Cancer epidemiology
- Genetic and environmental factors predisposing for malignancies
- Clinical presentation of tumors, potential metastatic sites and tumor staging
- Emergencies at diagnosis and during treatment, including spinal cord compression, intracranial hypertension, tumor lysis syndrome, abdominal occlusion, septic shock, mediastinal acute compressive syndrome, and arterial hypertension
- Imaging, including functional Fluorodeoxyglucose Positron Emission Tomography (FDG-PET) in lymphoma and in other selected tumors; functional MRI in brain and other solid tumors; MIBG scintigraphy in neuroblastoma, and other new radiological procedures that may be important for the assessment of response and treatment strategies
- Principles of chemotherapy, immunotherapy and new agents: pharmacokinetics, pharmacodynamics, mechanisms of drug resistance, side effects and both short- and long-term complications related to chemotherapy or new therapies
- Spectrum of molecular biology of paediatric cancer
- Interactions between chemotherapy, immunotherapy and concomitantly administered drugs
- Treatment for haematological malignancies and solid tumors according to current national/international protocols at diagnosis and relapse
- Supportive care, including infection management, pain control and blood products transfusion
- Principles of bone marrow and peripheral stem cell transplantation and other cellular therapies
- Role of radiotherapy in different tumours
- Role of surgery in different tumours
- Principles of tissue collection for diagnosis and biological studies
- Prognostic factors and therapeutic implications
- Molecular markers as diagnostic and prognostic tools with treatment implications, including concepts of intra-tumoral heterogeneity and clonal evolution
- Basic concepts of evidence-based medicine and clinical trial methodology – early and late phase
- Ethical issues, consent, data protection
- Basic concepts of ‘Survivorship” and late effects

Module 2: Practical Activities

DIAGNOSTIC AND THERAPEUTIC APPROACH

- Clinical, laboratory and radiological investigations for appropriate staging of different tumors
- Interpretation of radiological investigations and laboratory findings
- Treatment planning at primary diagnosis or relapse, according to current national/international protocols
- Recognition and treatment of the main emergencies at diagnosis and during treatment
- Treatment of infectious diseases according to current guidelines
- Accurate pain evaluation and adequate treatment
- Palliative care
- Role of physiotherapy in paediatric oncology
- Dietary requirements during treatment of cancer
- Intrathecal drug administration and safety issues according to good clinical practice
- Management of acute reactions to drugs and extravasation of chemotherapy agents
- Management of central venous line complications
- Autologous hematopoietic stem cells transfusion procedure and treatment related complications
- Tumor and treatment-related follow up plan
- Communication with parents, children and adolescents
- Interaction and coordination with other professionals involved in the care of children and adolescents with cancer (i.e., nurses, psychologists, physiotherapists, dietitians)
- Specific needs for ethnically and socially diverse families

ADOLESCENTS / YOUNG ADULTS WITH CANCER

- Tumor behaviour, biology and treatment in adolescents and young adults with cancer
- Specific psychological needs in adolescents and young adults with cancer
- Consent, aspects and ethical aspects in adolescents and young adults with cancer

MINIMUM NUMBER OF PROCEDURES TO BE PERFORMED

- 25 lumbar punctures
- 25 bone marrow aspirations
- 20 bone marrow biopsies
- 1-5 skin biopsies

MINIMUM NUMBER OF PATIENTS TO BE EVALUATED
At least 2 out of 3 following patients' groups: ▪ 15 patients with haematological malignancies ▪ 10 patients with CNS tumors ▪ 15 patients with other solid tumors

Module 3: Diagnosis, Treatment and Follow-Up

LEUKEMIA (ALL, AML)

- Constitutional and genetic conditions predisposing to leukemia
- Genetic classification
- Management of the treatment-related complications, including tumor lysis, coagulopathy, thrombosis, infections, septic shock
- Treatment according to different types of leukemia
- Indications for bone marrow transplant
- Current role of radiotherapy and associated complications
- Cytogenetic and molecular aspects affecting prognosis and treatment in infants and children
- Clinical, laboratory and molecular response to treatment for prognosis and treatment plan
- Management of testicular, CNS and bone marrow relapse
- Late effects and long-term follow-up

MDS and JMML

- Management of myelodysplastic syndrome and rarer forms of childhood leukemia (such as chronic myeloid leukemia and juvenile myelomonocytic leukemia)
- Differential diagnoses of pancytopenia
- Management options of low-grad MDS; observation, immunotherapy, HSCT
- Management options of MDS with excess of blasts; limited effect of chemotherapy, HSCT
- Diagnostics of JMML by clinical, haematological and genetic factors
- Therapy depending on genetics varying from observation to HSCT
- CML: knowledge of the initial therapy, cytoreductive therapy, and long-term therapy with tyrosine kinase inhibitors
- Late effects and long-term follow-up

HODGKIN'S DISEASE

- Histological subtypes and influence on prognosis
- Diagnostic procedures
- Role of FDG-PET at diagnosis and in assessment of response and treatment intensity
- Staging, stratification and therapy of patients according to international protocols
- Potential late effects related to chemotherapy and radiotherapy: increased risk of second cancers mainly in patients receiving radiotherapy, cardiac and lung dysfunction, damage of reproductive function

- Long-term follow-up

NON-HODGKIN'S LYMPHOMA

- Histological subtypes and influence on prognosis
- Imaging at diagnosis and in assessment of response
- Diagnostic procedures incl. possible diagnosis on tumor touch imprints and effusions (cytomorphology, immunophenotype, genetics)
- Management of acute emergencies at diagnosis, including tumor lysis, mediastinal compressive syndrome, intestinal obstruction, airway compression and spinal cord compression
- Staging, stratification and therapy of patients according to international protocols
- Molecular-genetic characterisation
- Management of rare NHL subtypes
- Late effects and long-term follow-up of NHL

RENAL TUMORS

- Epidemiology, aetiology and congenital anomalies associated with Wilms' tumor and current screening strategy
- Symptoms and differential diagnosis of a renal mass
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- Pathology and molecular biology of renal tumors
- Nephroblastomatosis and Wilms' tumor
- Principles of treatment of unilateral, bilateral and metastatic Wilms' tumors
- Management of tumor or treatment related symptoms/ complications (hypertension, rupture, V. cava thrombus, VOD)
- Molecular and pathological risk factors of Wilms' tumor related to outcome
- Principles of treatment of non-Wilms' renal tumors
- Late effects and long-term follow-up of renal tumors

NEUROBLASTOMA

- Updated neuroblastoma classification
- Genetics in neuroblastoma
- Stage Ms Neuroblastoma
- Knowledge of paraneoplastic syndrome (opsoclonus-myoclonus-ataxia and secretory diarrhoea)

- Management of clinical tumor-related problems, i.e., hypertension, spinal cord compression
- Laboratory findings: urinary catecholamines, neurone specific enolase, ferritin and lactate dehydrogenase
- Treatment and prognosis according to age, stage, histology and molecular-genetic aspects (such as MYCN amplification)
- Role of MIBG scintigraphy for assessment of response
- Immunotherapy (anti-GD2 therapy, retinoic acid)
- Late effects and long-term follow-up

BONE TUMORS

- Genetic (i.e., Rothmund-Thompson Syndrome/RECQL4, Li-Fraumeni/TP53, retinoblastoma/RB) and non-genetic predisposing factors (e.g., previous irradiation) and screening strategies in affected individuals.
- Differential diagnosis of a suspected bone tumor, according to anatomic site (e.g., metaphyseal, diaphyseal or epiphyseal), patient's age and radiological aspects (e.g., Codman's triangle). Admission to a tumor orthopaedic centre for biopsy and histopathological as well as genomic aspects of osteosarcomas (e.g., high-grade vs. low-grade, genomic instability) and Ewing Tumors (EWS1-FLI1 fusion gene, MIC-99, epigenetics)
- Frequency and site of primary metastases (i.e., lung metastases, skip metastases) and staging investigations.
- Systemic therapy: Role of neoadjuvant chemotherapy to facilitate surgery and assess tumor response to treatment (good and poor response criteria). How to choose adjuvant chemotherapy.
- Local therapeutic approaches: Ablative (amputation and rotation plasties) vs. limbs salvage surgery (allo-, autografts or prostheses) and the role of radiotherapy (photon-, proton- or heavy ion therapy).
- Classification of resection margins and importance of completeness of surgical resection.
- Liquid biopsies in bone sarcomas
- Late effects and long-term follow-up after bone sarcoma therapy: Principles of rehabilitative and preventive care.
- Management of relapsed disease

SOFT TISSUE SARCOMA

- Diagnostic procedures, histological and biological subtypes of RMS, prognosis and inherent treatment stratification based on histology/molecular diagnosis, IRS-stage, size, site, and nodal stage. Importance of adequate local therapy, often including
- radiotherapy. Basic chemotherapy schedule for low, standard and high and very high-risk RMS

- Diagnostic procedures, main non-RMS STS subtypes, prognosis and inherent treatment stratification, based on histology/ molecular diagnosis, IRS-stage, grading (according to FNCLCC), size and localisation
- Late effects and long-term follow-up

CNS TUMORS

- Different biopathological types of brain tumors and related treatment (medulloblastoma, low grade glioma, high grade glioma, brainstem glioma, ependymoma, germ cell tumors,
- craniopharyngioma, atypical teratoid/rhabdoid tumors and other rare brain tumors)
- Accurate staging, including the use of RMI spine and CSF cytology in medulloblastoma, intracranial germ cell tumors and other selected tumors, serum and CSF tumor markers in intracranial germ cell tumors
- Multimodal treatment concepts and role for targeted therapies
- Impact of subgroups, variants, cytogenetics and other molecular abnormalities affecting prognosis and treatment (i.e. MYC family genes and β-catenin in medulloblastoma)
- Complications and late effects arising from tumor, surgery, radiotherapy, and chemotherapy related to patient's age and stage of development (potential neurological, endocrinological, cognitive sequelae and behavioural changes)
- Predisposition to CNS tumours
- Multi-disciplinary team approach to rehabilitation and specificities of long-term FU after CNS tumour

RETINOBLASTOMA

- Genetic counselling
- Staging of retinoblastoma according to tumor extent
- Indications for enucleation
- Relationship between post-surgical tumor extension and treatment after enucleation
- Approach to bilateral retinoblastoma
- Role of conservative treatments, including new approaches
- Imaging of retinoblastoma
- Screening and follow up in siblings and descendants of a patient with retinoblastoma
- Secondary cancer after retinoblastoma
- Late effects and long-term follow-up

HEPATIC TUMORS

- Differential diagnosis of right upper quadrant masses

- Congenital and acquired conditions associated with an increased risk of hepatoblastoma and hepatocellular carcinoma
- A basic understanding of the molecular biology of hepatoblastoma
- Role of serum α-fetoprotein in the diagnosis and monitoring of treatment in liver tumors
- PRETEXT staging system and associated annotation factors in hepatoblastoma
- Treatment of hepatoblastoma and hepatocellular carcinoma
- Prevention of cisplatin-induced ototoxicity
- Indications for liver transplantation in the management of hepatic tumors
- Late effects and long-term follow-up

NON-INTRACRANIAL GERM CELL TUMOURS

- Epidemiology and Biology
- Conditions predisposing to GCT
- Embryology and Histological classification
- Biomarkers and Molecular biology
- Diagnosis
- clinical presentation and investigations
- Treatment
- Surgery
- Chemotherapeutic strategies
- Current treatment approaches
- Follow-up and long-term effects
- Relapse treatment

HISTIOCYTOSES (LCH, RARE NON-LCH AND HLH)

- Classification of the histiocytoses
- Diagnostic criteria
- Staging and stratification of LCH
- Prognostic factors in LCH
- Standard treatment of multisystem LCH
- Standard treatment of HLH
- Late effects and long-term follow-up

Module 4: Research Aspects

- Clinical trial methodology, including rationale and aims, study design, eligibility criteria, toxicity notification, response to treatment
- Ethical aspects
- Data reporting
- New drug development, precision cancer medicine, immunotherapy and other microenvironment targeted drugs, epigenetics targeted drugs
- Principles of statistics

Module 5: Continuous Medical Education

- Good clinical practice: attendance at specific biannual course organized by certified providers
- Attendance at international courses/meetings/congresses: at least one during the training
- Attendance at national courses/meetings/congresses: at least one a year
- Participation in Institution's multidisciplinary tumour boards

Module 6: Optional 3rd Year in a Specified Field:

Haematological malignancies, solid tumours, brain tumours

HAEMATOLOGICAL MALIGNANCIES

Allogeneic Bone Marrow Transplantation

- Donor selection
- Donor counselling
- Stem cell harvest and graft manipulation
- Management of supportive care and acute complications
- Conditioning/immune suppression/transplant immunology
- Post-transplant surveillance, evaluation and treatment of late effects

Laboratory Haematology

- Bone marrow, blood, CSF cytology and morphology
- Flow cytometry
- Immunophenotyping
- Histopathology/cytochemistry
- Cytogenetics and molecular-genetics

SOLID AND BRAIN TUMOURS

Additional practical training with focus on multi-disciplinary team interaction, molecularly based treatment and future protocols

CELLULAR THERAPIES OTHER THAN STEM CELL TRANSPLANTATION

- Current applicative scenario of immunotherapy in paediatric haematology and oncology
- Novel antibody-mediated immunotherapy
- CAR T-cells
- Limitations of CAR T-cell therapies
- Toxicities of CAR-T-cell therapies

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