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Progress in pediatric oncology: state of the art and an insight into a new decade

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EDITORIAL

Progress in pediatric oncology: state of the art and an insight into a new decade

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Despite decreases in the cancer death rates in high-resource countries, the number of cancer cases and deaths is projected to more than double worldwide over the next 20-40 years. Cancer is now the third leading cause of death, with >12 million new cases and 7.6 million cancer deaths estimated to have occurred globally in 2007. By 2030, it is projected that there will be approximately 26 million new cancer cases and 17 million cancer deaths per year. The projected increase will be driven largely by growth and aging of populations and will be largest in low- and medium-resource countries [1].

In industrial countries, 1 child out of 500-600 develops a cancer before the age of 15 years, and for almost half of them it happens before the age of 6 years. Thus, the annual rate for childhood cancers in developed countries amounts to 105-130 new cases per 1 million children [1-3]. Between age 10 years to late adulthood, the incidence of cancer increases exponentially with age. There are nearly 3 times more patients diagnosed during the second 15 years of life than during the first 15 years, accounting respectively for 2% and 0.75% of all invasive cancers [2]. One in every 168 humans develops invasive cancer between age 15 to 30 years. Childhood tumors are very differentiated with respect to histological types and anatomical locations. The incidence of these tumors considerably differs from that observed in adult population. The distribution of cancer in children varies from that of adults [3-5], as well as biology and cytogenetics of some types of malignancy [6-7]. However, since the classifications used to describe children/adolescents and young adults/adults cancer are different, comparison of the distribution is not that easy.

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There are two key issues that have focused debate on cancer in young people. The first issue is the marked increase in incidence of cancer in young people. The second issue is the epidemiologic data that suggest cancer outcomes in young people are underperforming both their pediatric and adult counterparts. Due to different distribution of cancer in age groups, survival from young people must be always separately compared with pediatric and adult series regarding specific cancer types [2, 4]. In general, cure rates for these cancers are higher for younger than for older adult cancers.

Age has important prognostic impact in oncology. The distribution of cancer, as well as its biology, cytogenetics and therapy outcome vary between children and adults.

Major advances in the treatment of childhood leukemia and other pediatric neoplasms have led to a striking

improvement in survival over the last 30 years. With multi-agent chemotherapy, currently almost 80% of children but only 40% of adults reach long-term remission in acute lymphoblastic leukemia. Lessons obtained from pediatric oncology, especially from acute lymphoblastic leukemia might contribute to significant progress in adults with cancer.

The future perspective for the research are aimed to molecular biology. However, apart from analysis of tumor molecular biology, we can speculate about molecular biology of patient. Reaction between normal tissue and tumor tissue is going to be the matter of analysis. Pediatric patients with the same tumor biology have usually better prognosis than adults because of reaction to chemotherapy, including immunological reactions, which is different in children. A new insight into immune system can provide a lot of information. The future is in identification of genes, genomic profile, single targets, unique tumor profile, gene polymorphism, individualization of therapy for patient. Tumors with the same histology might be driven by different pathways. Regardless of morphological diagnosis, a tumor with specific molecular aberration of activated signaling pathway will be diagnosed and treated in the future. Functional imaging and individual tumor functional sensitivity profiling will be coming into clinical practice.

Recommendations for future oncology will be based on the use of molecular and pharmacological achievements. Microarray analysis might help to select types of cancer susceptible for individualized and targeted therapy or immunotherapy. Drug dosage might be adapted to activity of enzymes, based on polymorphism studies. Genetic and molecular studies will enable to assess the relative risk of therapeutic failure or drug toxicity. The “era of glivec”, first highly selective tyrosine kinase inhibitor, presents possibilities unknown a decade ago. A large number of specific genes present in cancer cells is already known. Both pediatric and adult oncologists are facing the problem of understanding molecular mechanisms, which will impact the anticancer therapy. Another issue is to understand immunological properties of cancer and its host. The real challenge is to diagnose cancer at early stages of the disease. The programs of screening might help to detect the disease or its risk.

This issue of Journal of Pediatric Sciences brings a selection of papers reviewing current knowledge on pediatric malignancies. All Authors point on a progress in diagnosis and therapy of childhood cancer, and an insight into a new decade is given.

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