different opioids in different application forms. Luckily we have choice of different opioids with their advantages and disadvantages. But some problems of opioids are class effects or problems of the opioid system (opioid receptor). In this meaning, new opioids will only have a limited chance for further progresses in analgesia. So-called co-analgesics act mostly through the effect of, what has a more or less effect of sedation with it. New drugs has to take into account, that pain is multidimensional and has something to do with awareness, categorizing, and other learning effects of the brain, which are very different in our patients. This means, that a multidimensional approach of the pain is necessary. For this approach we have to understand, what the pathophysiology of the pain is, what the pain means for the patient and if the nervous system and the brain are already hyper alert or hypo alert. Only if we have understood this step, we can do a better and more individualised pain therapy.
For research that means, that we can't see the pain only as a illness of the nervous system on the basis of receptors, transmitters and nerve fibres. We have also to look after the functioning, the learning style, the coping mechanism, fear and other psychological and social reaction to know how to intervene best.

Scientific Symposium (Sun, 25 Sep, 14:45−16:45)
The Role of Medical Technology in Building a Sustainable Cancer Care

194 INVITED

How Medical Technologies and Pharmaceutical Industry Can Work Together

F. Ginty[1]. [1]*GE Global Research Center, Diagnostics and Biomedical Technologies, Niskayuna NY, USA*

Over the last five years, scientists and engineers at GE Global Research Center have been developing a new fluorescence microscopy-based method for multiplexed analysis of >30 proteins *in situ* in a single section of formalin fixed paraffin embedded tissue (FFPE). This provides high content fluorescent imaging at the single cell level and uniquely enables the simultaneous evaluation of multiple markers in multiple sub-cellular compartments, without destruction of the sample. By inclusion of epithelial, stromal cellular proteins in the multiplexed staining sequence, we have demonstrated subcellular protein expression, phosphorylation and co-localization in individual cells. Since multiple proteins are analyzed on the same tissue section, precious clinical sample is saved. Collaborating with pharma and clinical institutes has been an essential part of this work, and has ensured the validity of the technology, the needs of researchers are met and the end applications are clinically relevant. Over the last 4 years, we have been working with scientists at Eli Lilly to utilize the multiplexing technology to evaluate potential predictive and prognostic biomarkers as part of their drug discovery process. New insights have been gained into biomarker response in drug-treated xenografts and heterogeneity of biomarker expression prostate cancer. This collaboration could ultimately lead to new diagnostics for patient stratification and prediction of drug response.

195 INVITED

Recent and Future Advances in Cancer Imaging

S. Schubert[1]. [1]*GE Healthcare, Oncology, Waukesha, USA*

Cancer care today involves millions of multi-modality imaging exams, including CT, MRI, PET/CT, SPECT, X-ray and Ultrasound. Advances in cancer imaging are driving new clinical standards in early detection, targeted therapy and assessment of treatment response. Early detection is being improved by advances in imaging resolution, soft tissue visualization and anatomical+functional detail. These advances also enable therapy targeting with millimeter precision, and targeting in the presence of anatomic motion and physiologic change. Quantitative measurements enable rapid assessment of treatment response and recurrence, driven by technological advances, validated software tools, and standardized clinical protocols. Future advances in cancer imaging will continue improve care across the cancer lifecycle.

196 INVITED

IT Enabled Clinical Decision Support and Integration of Cancer Care-Role of EMR and Cancer Registries

J. Goldwein[1]. [1]*Elekta, Medical Affairs, Stockholm, Sweden*

Background: Electronic Medical Record (EMR) systems dedicated specifically to the care of cancer patients are widely available and currently in common use world-wide. For Radiation Oncology, they are an absolute necessity for treatment delivery. As these systems have evolved, they have become both more sophisticated and have been increasingly integrated into the workflow throughout the cancer care continuum. For example, they have not only been equipped with provisions to support control of complex external devices such as linear accelerators, but also with interfaces to exchange data with allied information systems, features to enhance treatment safety, and direct connections to cancer registries. Ultimately, these types of capabilities are expected to facilitate continuous improvements in cancer care and treatment outcomes.
Using the Elekta EMR (called MOSAIQ) as an example, we will demonstrate the ability of such systems to support a new Electronic Health Record paradigm that promotes this advanced clinical decision support and facilitates the integration of cancer care programs.
Material and Methods: Architecturally, MOSAIQ is deployed in a way that allows users in a Medical Oncology facility to readily share data and information with Radiation Oncology users managing a common cohort of patients, leading to highly integrated and coordinated care. Data elements collected represent a rich superset of Cancer Registry data.
A pilot study of the use of this system as the foundation for establishment of a real-time radiation oncology data registry was mounted in the USA in 2009. The aggregate is composed of de-identified demographic, treatment and follow-up data routinely collected in the course of patient care, and automatically collected and uploaded from each participant's EMR to a central data warehouse on a monthly basis. This system is intended as a model that will be used for the establishment of a US Comparative Effectiveness Research registry on behalf of ASTRO's National Radiation Oncology Registry (NROR) program, and thus designed to be readily scaled in terms of numbers of facilities, number of data elements collected, and geographic locations.
In conjunction with these efforts, features are being incorporated inside MOSAIQ to support "intelligent" care delivery capabilities and permit, for example, the implementation of structured treatment protocols that can be modified to accommodate workflows specific to a locale. These protocols can be followed within and across centers, and can help coordinate and support care delivery in a consistent and structured manner.
Results: The MOSAIQ software is in use in approximately 60% of radiation oncology RO clinics in the US, with significantly increased utilization outside of the US, (37% and 54% growth in 2010 and 2009 respectively).
For the registry pilot program, approximately 50 demographic, treatment and follow-up data elements are collected. These data are core to patient care and routinely collected during treatment, and thus have required minimal additional burden on the part of participating facilities.
To date, a total of over 171,800 patient records have been aggregated over a course of approximately 1,576 automated de-identified data uploads from approximately 35 participating facilities. Data collection adherence for any particular element varies across the facilities, with some nearing 100% compliance and others ranging as low as 20%.
Efforts to enhance MOSAIQ for the purposes of improving data consistency and quality are being pursued. Hard coded safety-related interlock integrated into the software and incorporated into the work flow double as data quality enforcement tools, and a process being released will support development of customized alerts and interlocks and that will further enhance data quality.
Standard treatment protocols that support the management of patients in accordance with certified guidelines are incorporated into the system along with direct links to guideline agencies such as NCCN. Along with provisions to determine eligibility for clinical trials, these features provide a toolset that can be used to manage patients both on and off of clinical studies.
Conclusions: Electronic Medical Records systems used for Oncology care are amongst the most advanced available and in use today. Provisions to support treatment pathways, to enhance and enforce safety, to collect and aggregate data in near-real time, and to feed such data back into these systems to support decision making are among the current and near term features being incorporated into these systems. These programs will not only lead to safer, more efficient and effective care, but will also form the foundation for support of world-wide comparative effectiveness research (CER), guideline-directed care, and enhanced utility of device technology which should ultimately cascade to outcome improvements universally.

197 INVITED

Molecular Diagnostics Role in Personalised Cancer Care

Abstract not received

198 INVITED

The Future of Radiation Therapy in Comprehensive Cancer Care

S. Johansson[1]. [1]*Elekta AB, Stockholm, Sweden*

Cancer is a very challenging condition and one of the fastest growing health challenges in the developed world. As cancer is not one but hundreds

of conditions it cannot be expected to be managed by one approach. The cellular, metabolic and genetic factors as well as location, stage and extent all contribute to the characterisation of the disease as well as the therapeutic approach.
Radiation should be viewed as a very powerful therapeutic agent in the arsenal to combat cancer. New technological advances have given us tools to apply radiation in a variety of ways dependent on clinical situation. Increasing precision of the radiation therapy systems is creating a trend towards higher doses delivered over shorter time periods. The use of stereotactic techniques is becoming more common. This increased precision, facilitated by image guidance integrated with systems, is decreasing exposure to the healthy tissue and hence with reduced complications. From being viewed as palliative care, radiation therapy has transformed to being applied with a curative intention in many clinical situations. A case example is Leksell Gamma Knife that delivers high doses with pin-point accuracy to tumours in the brain. In Gamma Knife surgery the therapeutic dose is delivered in one session and image guidance relies on advanced MRI technologies. In brain metastase patients the treatment has the potential to significantly transform the outcome and management options for large patient groups, having breast and lung cancer as primary cancer disease.
Technologies applied in modern cancer care are continuously evolving and we have seen how radiation protocols are being combined with other methods in integrated management approaches. By combining radiation with other modalities such as surgery as well as biological agents and drugs further improvement can be achieved. Future more comprehensive care processes require collaboration between specialties and information and communication become important features to be able to utilize the most cost effective treatment. In this paper the global utilization of RT is further discussed with an overview of some national and global examples how the care practice of RT has been evolving. Trends and recent advancement will be discussed as well as cost-effectiveness aspects of radiation therapy. The need for strengthening partnership between industry and healthcare providers will be discussed as both are critical partners in the fight against cancer. Technological advancements and methods would not become available to health systems around the world without an Industry that develops solutions, secure that products meets regulatory demands and are properly tested prior to introduction.

Scientific Symposium (Sun, 25 Sep, 14:45−16:45)
Brain Tumours in Children and Adolescents

199 INVITED

Are Adult and Paediatric High Grade Gliomas the Same − Insight From Biology and Molecular Pathology

J. Grill[1], S. Puget[2], C. Philippe[3], G. Vassal[3]. [1]*Institut Gustave Roussy, Paediatric Department, Villejuif,* [2]*Necker Enfants Malades Hospital, Neurosurgery, Paris,* [3]*UMR CNRS 8203, Pharmacology and Anticancer Treatment, Villejuif, France*

High-grade glioma are relatively uncommon among the pediatric brain tumours. Most of the studies performed to date have followed the lines of treatment that were proven effective in adults, assuming their similarity (if not the identity) to adult type of malignant gliomas. Due to the rapid development of more targeted therapies in adult glioblastoma, there is now increasing concern about how these compounds should be evaluated in children. The first step is to compare and contrast the types of malignant gliomas occuring at different ages. Indeed, there is growing evidence that the biological knowledge and the histo-prognostic classifications used for the management of adult high grade gliomas (aHGG) may not fully apply to children. Interobserver variability and specificity of pediatric tumours with respect to the World Health Organization (WHO) classification have lead to a high rate of misclassification in multi-institutional studies. A wide range of molecular analysis performed in adults' malignant gliomas has helped to identify molecular pathways and signatures associated with prognosis. Conversely, very few molecular studies have been performed on pHGG and usually to track the alterations described in aHGG. These studies, have shown that they rarely share the same abnormalities than aHGG, suggesting different underlying biology. Recent microarray studies of pHGG tumours and cell lines have confirmed these earlier results and pointed towards molecular abnormalities more specific to the pediatric age, eg PDGFRA rather than EGFR amplifications or Ras pathway activation rather than PTEN deletions or mutations. However, the conclusions of most studies were limited by the small size and the absence of validation set. Despite, these biological differences, pHGG ressemble aHGG with respect to histology, radiology and the major biological processes involved, eg invasion or neoangiogenesis. It is therefore important to understand the role of the alternative pathways for oncogenesis identified in children, as well as their prognostic and therapeutic implications. We will propose a new classification scheme integrating both genomic and gene expression data with clinico-pathological features as an attempt to improve the molecular classification of pediatric. Some biological entities described here are unique to the pediatric age but some others, especially in older children and adolescents may share some of the characteristics of adult type of glioblastoma. We believe that a better insight in the specific biology of pediatric high-grade gliomas will help to decide which patients deserve to have the same treatment than adults and for which patients specific pediatric trials should be developped.

200 INVITED

The EU Research Strategy for High Grade Glioma in Children and Adolescents − Can We Extrapolate From Adult Data?

D. Hargrave[1]. [1]*UCL Institute of Child Health, Paediatric Oncology, London, United Kingdom*

High grade glioma (HGG), as defined by the WHO classification of tumours of the central nervous system, occurs at all age groups but emerging molecular data suggest significant differences in the underlying biology between children and adults. Historically both preclinical cell line and clinical trial patient data from adult HGG cell have informed the thinking and design of clinical interventions in childhood and adolescent HGG. However, comparison of the results of clinical studies of HGG between adults and children have shown differences in outcomes which may reflect actual differences; in the biology of age related sub-groups, differences in clinical end-points used or potential pharmacokinetic variables. Comparisons of HGG clinical data will be reviewed and possible reasons for variance in outcomes discussed.
The possibility and validity of extrapolating data from adult HGG into childhood and adolescent patients in the context of the EU research/ regulatory strategy will be presented, with suggested recommendations with regard non-clinical and clinical study design.

201 INVITED

Molecular Characterization of Medulloblastoma − the Route Towards Personalized Care

Abstract not received

202 INVITED

Functional Imaging in Adult and Paediatric Brain Tumours

Abstract not received

Special Session (Sun, 25 Sep, 14:45−16:45)
MIRACLE Workshop: Novel Technologies for the Isolation and Analysis of Circulating Tumour Cells

203 INVITED

Enumeration and Characterization of Circulating Tumour Cells

L.W.M.M. Terstappen[1], G. van Dalum[1], F.A.W. Coumans[1], A. Hoeppener[1], S. Ligthart[1], J. Swennenhuis[1]. [1]*University of Twente, Faculty of Science and Technology Medical Cell BioPhysics (MCBP), Enschede, The Netherlands*

Technologies that can detect and characterize Circulating Tumour Cells (CTC) hold great promise as they are expected to replace metastatic tissue biopsies and used to predict drug response and resistance, and monitor therapy response and cancer recurrence. The interest in CTC has increased in recent years driven in part by studies that have validated the early promise. A variety of technologies have emerged for CTC detection urging the need for standardization as the CTC frequencies reported with different technologies can deviate significantly from the one used in the CellSearch® system, the only system, that has been validated in multicenter prospective studies. Here we will review the definitions of a CTC and its relation with clinical outcome and will review the state of the art of detection of treatment targets in CTC.

204 INVITED

Microchip-based CTC Isolation

Abstract not received