Results: We adopt a standards-based approach in the development of our semantic interoperability layer. The semantics of the clinical terms will be captured by standard terminology systems such as SNOMED CT, ICD, LOINC, and scalability will be achieved by modularization, identifying a core dataset which covers the chosen clinical domain and our data. The core dataset will be validated by clinical and knowledge engineering experts to assure proper coverage and soundness.
Relevant clinical scenarios have been identified and formalized in technical use cases, and are used as basis for our requirements analysis. We have defined an open, service-oriented architecture which provides the technical blueprint for the implementation of the INTEGRATE framework (www.fp7-integrate.eu).
Conclusions: The huge potential of the current biomedical research in oncology cannot be fully exploited in the absence of a coordinated and systematic approach. Our infrastructure will enable the sharing within a large biomedical community of comprehensive datasets and knowledge generated by clinical trials. The project will support BIG in promoting in the clinical community new methodologies and standards concerning the collection, processing and sharing of data. This will improve the reproducibility of high resolution translational research embedded in clinical trials and facilitate future research.
Acknowledgement: This project is partially funded by the European Commission under the 7th Framework Programme.

2162 POSTER

Implementation of an Open Source FDA and GCP Compliant Electronic Case Report Form (eCRF) System in an Oncology Department − an Option?

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Introduction: The data monitoring, regulatory procedures and data management in investigational trials are still having trouble to fulfill the national legislation. Investigators are forced to use inadequate tools in their trials − there is no audit trails in an excel worksheet.
Internet-based connectivity offer resources to improve the quality and efficiency of data management operations.
At Herlev University Hospital and Rigshospitalet, Departments of Oncology, we have implemented an Open Source FDA and GCP compliant Electronic Case Report Form (eCRF) system − OpenClinica. The system covers all the data management processes.
Materials and Methods: Several both commercial and Open Source eCFR systems were investigated to ensure if they fulfilled governmental legislation and GCP demands. Secondly a set of minimum requirements were established concerning system functionality and security. It was decided to implement OpenClinica based on above considerations and the following criteria: economy, department policy, resources, IT infrastructure and availability.
An implementation plan was created including (main tasks only): Testing as part of FDA and GCP compliance
- IQ − Installation Qualification
- OQ − Operational Qualification
- PQ − Performance Qualification
- Site Standard Operational Procedure (SSOP), not yet finished.

Results: At the Departments of oncology, three studies have been up using OpenClinica, as summarized below.
- Project I. Enrolled 51/51 finished (Normal complexity)
- Project II. Enrolled 589/800 (Complex)
- Project III. Enrolled 2/500 (Very complex)

The complexity refers to treatment schedule and amount of different eCRFs. The final aim is to use OpenClinica for all investigator initiated studies in the department.
Discussion: At a time when clinical resources and financial budgets are tight, we have to find new ways to solve problems with inadequate data management tools. One option might be to turn to the many Open Source programs available today.
To succeed in implementing an Open Source FDA and GCP compliant eCRF system one needs:
- Allocation of adequate resources in the form of skilled dedicated staff covering the whole data management process including research nurses, physicians, secretaries and IT personnel.
- Funding − The system is free BUT the implementation is NOT.
- A well defined time implementation plan.
- Preferably some person(s) with experience from similar projects

2163 POSTER

Integrating Web-based Real-time Analysis System With Clinical Research Database Facilitates Interim Analysis

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Background: Interim analysis is usually used for assessing patients' performance on clinical trials and modification or early termination of the trial if there is large difference between treatment groups. However, performing interim analysis requires separate data collection and processing at certain predetermined points. The study aim was to decrease time and effort needed for collecting, validating, cleaning and analysing data.
Materials and Methods: In our novel technique, we have developed a clinical research system that entitles performing real-time data collection for our patients and feeding the database with updates at each visit. Data were validated automatically at data-entry step and challenged against different algorithms. Real-time statistical analysis results including survival analysis are updated in numerical and graphical presentations without the need for stopping the trial or data collection. The whole trial results are updated collectively based on each individual visit. This instant statistics interface is made available for independent researchers and auditors.
Results: With automated web-based solution, data-entry validation, cleaning and simultaneous analysis time and effort decreased significantly. Moreover, interim analysis became available at any point in the trial so allowed the researcher to examine the trial concurrently. This can help the researchers to modify the trial at any time earlier or later than a predetermined point. Its web-based property made the results available remotely for central reviewing and auditing.
Conclusion: Integrating online statistical analysis with clinical research systems improved data-entry process, and study monitoring, hence it improved the interim analysis and decision making.

2164 POSTER

Central Multi-disciplinary Consultation and Decision Making on Treatment of Patients With Complex Tumours

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Objective: Centralization of the decision making on treatment of patients with complex tumours in order to achieve proper treatment and care for every oncological patient in north east region of The Netherlands, by multi site and multi-disciplinary oncology meetings with expert consultants.
Background: The comprehensive cancer of The Netherlands (CCCN) aims to achieve proper treatment and care for every oncology patient within the country. To reach this aim, the CCCN can call upon the consulting services of 400 medical experts from university medical centers. One of the tasks of these experts is advising medical specialists in general hospitals, thus ensuring the availability of high-quality specialised cancer care throughout the Netherlands.
Methods: Through expert consultation and centralised decision making in tumour boards, patients can rely on being treated at the highest quality level, according to the latest findings, regardless of the hospital. In recent years the CCCN initiated general tumour boards to be replaced by tumour-specific multi site and multi disciplinary meetings. Sometimes with 4 to 6 hospitals simultaneously, accompanied by one or more consultants from the expert center. To enable these meetings video conference is used.
Video conferencing involves specific demands on the organization of oncology meetings. The CCCN supports hospitals in buying, installing and using the hardware. The CCCN supports secured webbased patient information sharing among participants. The CCCN provides virtual meeting rooms, using videoconferencing standards and internet, in which all kinds of diagnostic images can be presented in real to all participating locations. Hospitals are provided with training of members and chairmen. A guideline is developed for the organisation of multi site oncology meetings per videoconferencing, including a format for patient presentation.
Results: All hospitals in the CCCN-region have facilities for video conferencing. In addition, all radiotherapy centers and pathology laboratories use video conferencing to participate in the tumour boards, which easily and secure take place in a virtual meeting room. It's possible to share data during videoconferencing: on one screen the participants of the other locations are projected, on the other screen the patient presentation and images such as CT scans. Even tele-pathology through high definition coupe scanners can be used in tumour boards. Several multi site tumour specific tumour boards are implemented. For instance for ovarian cancer and urologic tumours on a weekly basis, so that all patients are being discussed with experts before the start of their treatment.

Conclusions: Video conference facilitates the centralization of decision making on treatment in an efficient way. Patients with complex tumours can count on assessment and decision making by experts at the highest possible quality level. The roll out of this good practice is planned for other tumours.

2165 POSTER

Targeting of Interferon Gamma to Stromal Fibroblasts Using a PDGF Receptor Recognizing Carrier Reduces Tumour Growth in Vivo

J. Prakash[1], R. Bansal[1], T. Tomar[1], A. Ostman[2], K. Poelstra[1]. [1]*Groningen Research Institute for Pharmacy, Pharmacokinetics Toxicology and Targeting, Groningen, The Netherlands;* [2]*Karolinska Institute, Oncology-Pathology, Stockholm, Sweden*

Background: Stromal fibroblasts are the key cell types in tumour stroma, that support angiogenesis, tumour cell proliferation and metastasis. Therefore, inhibition of stromal fibroblasts activity might inhibit tumour growth. Interferon gamma (IFNγ) is a potent cytokine and has been used for the treatment of experimental fibrosis. However, poor pharmacokinetics and severe side effects prevented its clinical application. In this study, we hypothesized that specific delivery of IFNγ to stromal fibroblasts may be beneficial to inhibit the tumour growth. Since Platelet-derived Growth Factor beta receptor (PDGFβR) is abundantly expressed on stromal fibroblasts, we developed a PDGFβR-specific drug carrier (PPB-HSA) by modifying albumin with a PDGFβR-recognizing cyclic peptide to deliver IFNγ.
Materials and Methods: The IFNγ was conjugated to PPB-HSA carrier via a heterobifunctional PEG linker and characterized with Western blot analyses and nitric oxide release assay in RAW monocytes. In vitro, PPB-HSA-IFNγ was examined for its effectivity in 3T3 fibroblasts using wound healing assay, immunocytochemistry and qRT-PCR. To simulate fibroblasts-induced angiogenesis process, tube formation assay was developed in which conditioned medium from 3T3 fibroblasts (incubated with TGFβ and IFNγ or IFNγ constructs) was added to the endothelial cells (H5V) and tubes formed were counted. In vivo, the effects of the targeted PPB-HSA-IFNγ on tumour growth were determined in subcutaneous B16 melanoma tumour model in mice. Treatments with vehicle, IFNγ, PPB-HSA-IFNγ, PPB-HSA ($n = 5$ per group) at the equivalent doses (5 μg/dose/mouse) were administered intravenously.
Results: PPB-HSA-IFNγ construct was successfully synthesized and the conjugated IFNγ retained its biological activity. The construct showed PDGFβR-specific binding in 3T3 cells which was blocked with anti-PDGFR antibody. The IFNγ construct significantly inhibited the proliferation and migration of 3T3 cells as determined with wound healing assay. Treatment with the targeted IFNγ drastically reduced TGFβ-induced collagen-I, alpha smooth muscle actin and fibronectin expression in staining and gene expression. Furthermore, the PPB-HSA-IFNγ inhibited the 3T3 fibroblasts-induced angiogenesis as determined with the tube formation assay in H5V cells. In vivo, the targeted IFNγ construct attenuated the tumour growth by 60% ($p < 0.01$) compared to vehicle whereas untargeted IFNγ and PPB-HSA carrier did not induce any reduction in the tumour growth.
Conclusions: These data demonstrate that specific targeting of IFNγ to the stromal fibroblasts using PPB-HSA carrier is a potential therapeutic strategy to inhibit tumour growth.

Poster Presentations (Sat, 24 Sep, 14:00−16:30)
Surgical Techniques

2500 POSTER

Identification and Image-guided Resection of Occult Superficial Liver Metastases Using Indocyanine Green and Near-infrared Fluorescence Imaging

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Background: Near-infrared (NIR) fluorescence imaging using indocyanine green (ICG) is a promising technique for identifying and resecting colorectal liver metastases, however, optimal dosage and timing is not known.
Material and Methods: The Mini-FLARE™ imaging system was used for real-time identification of colorectal liver metastases in 22 patients undergoing liver resection. NIR fluorescence imaging was performed 24 or 48 h after administration of 10 or 20 mg ICG. Resected specimens were prepared for *ex vivo* macroscopic and microscopic evaluation of fluorescent patterns.
Results: A total of 40 superficially located (<6.2 mm beneath the liver capsule) colorectal liver metastases were identified and resected using NIR fluorescence imaging and ICG. In all patients, ICG fluorescence was seen as a rim around the tumour, located microscopically in the transition zone between tumour and normal liver tissue. Median tumour-to-liver ratio (TLR) was 7.4 (range 1.9–18.7) and no significant differences between time-points or doses were found. NIR fluorescence signal in normal liver had returned to baseline by 24 to 48 hours post-injection, eliminating the need to test longer time-points. Four metastases detected using NIR fluorescence were occult, and not visible using preoperative CT, palpation, or intraoperative ultrasound (IOUS). NIR fluorescence also distinguished benign liver lesions from metastases. Preoperative CT, IOUS, and/or palpation, however, found seven lesions, all deeper than 8 mm, which were not seen using NIR fluorescence.
Conclusion: This study suggests that NIR fluorescence imaging is complementary to conventional imaging for liver metastasectomies, and has the potential to improve surgical cure.

2501 POSTER

Three-Dimensional Imaging Navigation Using an IPad During a Lung Segmentectomy

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Background: Lung screening using computed tomography (CT) has recently become widespread and many small lung lesions have been detected using this method. The requirement for anatomical lung segmentectomies has also therefore increased. We herein present the benefits of using three-dimensional (3D) imaging navigation during a lung segmentectomy via the intraoperative use of an iPad.
Materials and Methods: Images were obtained using a 16-channel multi-detector CT (MDCT). Contrast agent was injected at a rate of 5 ml/s (total dose, 1.2 ml/kg) and this was followed by a 40 ml injection of normal saline injection to wash the contrast agent from the pulmonary artery (PA). Contrast-enhanced scanning was then performed twice, at 7 seconds after the start of the injection for enhancement of the PA and at 18 seconds after the injection for enhancement of the pulmonary vein (PV). 3D images were constructed from 1.0 mm data slices using a workstation. Images of the PA, PV, airway (from the trachea to the subsegmental bronchus) and of the tumours to be resected were constructed separately and subsequently merged. These 3D images were then transferred to an iPad and analyzed during the operation using DICOM image viewer software. In the operating room, the iPad was placed inside a sterile bag and manipulated directly by the surgeons in the operative field.
Results: We performed six segmentectomies (right S1, right S2, right basal segment, left S1+2, left upper division, and left basal segment) between October 1, 2010 and March 31, 2011 using this procedure. Preoperatively, we identified the branches of pulmonary artery, pulmonary vein, and bronchus in the affected or adjacent segment using the 3D images, and simulated which branches should be divided or preserved for necessary and sufficient resection. During the operation, the surgeons were able to review and manipulate the 3D images interactively, and to easily identify actual anatomical structures.
Conclusion: A 3D-CT navigation using an iPad enhances the ability to perform a safe and secure segmentectomy.

2502 POSTER

Microwave Ablation of Ex Vivo Human Liver and Colorectal Liver Metastases With a Novel 14.5 GHz Generator

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Background: Ablation of colorectal liver metastases relies on the focal delivery of energy to a lesion causing tumour destruction. Targeted ablations minimise the removal of healthy parenchyma, and are useful in patients with borderline parenchymal volume and function, or anatomically difficult lesions which may not be amenable to formal resection. Previous attention has focused on radiofrequency ablation (RFA). Interest is now turning to microwave ablation which offers several theoretical advantages. Microwave radiation causes polarised water molecules to oscillate, generating heat by an active mechanism. This active heating mechanism means microwave energy is not reduced by transmission through charred and desiccated tissue, allowing more controlled and predictable tissue