of IGF1R monoclonal antibodies was so far focused in patients with sarcoma, and studies are ongoing in children and adolescents evaluating the combination with chemotherapy or mTOR inhibition.

278 INVITED

The IGF1 Growth Hormone Axis in Human Development

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Due to its major roles in initiation, progression and growth of tumours, the insulin-like growth factor (IGF) system, and more specifically the type I IGF receptor, has become a prime target for developing anti-tumour strategies. However, even if inhibiting this signaling pathway appears relevant to block tumour development, it may also affect the multiple physiological functions controlled by these secreted growth factors in particular during childhood and adolescence. In fact, IGFs are key elements that regulate growth and differentiation of many tissues and organs. Their complexity relies in particular on the fact that they are not only expressed in the liver, under the control of the somatotropic hypothalamic-pituitary axis, but also in all tissues where they played major autocrine and paracrine functions. Moreover, the strong homologies between the type I IGF receptor and the insulin one allows the constitution of hybrid receptors that need to be taken into account when developing therapeutic strategies. Studying human pathologies and animal models in which the IGF system is under- or over-regulated can shed lights on the main functions played by these growth factors during human development.

Scientific Symposium (Mon, 26 Sep, 09:00−11:00) **Novel Radiation Technologies and Strategies**

279 INVITED

Adaptive Radiation Therapy − Technology and Strategies

Abstract not received

280 INVITED

Integrated MRI-Guided Advanced Radiotherapy

J.J.W. Lagendijk[1], B.W. Raaymakers[1], M. van Vulpen[1]. [1]*University Medical Center Utrecht, Department of Radiotherapy, Utrecht, The Netherlands*

In Utrecht a radiotherapy accelerator is being developed with MRI functionality. This system offers superb soft-tissue contrast imaging directly from the treatment table. The operator sees the actual beam according to the actual anatomy real time. Due to the dynamic capability of MRI a full inventory of motion, deformation and response can be assessed to minimise the margins for geometrical uncertainties in the tumour position. MRI does not only provide improved target localisation but also better target characterisation by means of functional MRI.
For treatment guidance, MRI can visualise the tumour without the need of surrogates, and can also visualise the surrounding organs at risk. This can be done not only once prior to each fraction but continuously during dose delivery, so also intra-fraction motion, e.g. breathing related motion, can be tracked and corrected for. This presentation will give an overview of the system being developed at the Radiotherapy Department of the UMC Utrecht, the Netherlands in collaboration with Elekta and Philips: a 6 MV accelerator with diagnostic quality 1.5 T MRI functionality. We expect that MRI guided Radiotherapy will become the new standard treatment machine. The moment we see what we do, on line, treatment improvements and dose optimisations are unavoidable. Dynamic on line MRI guidance can produce a breakthrough for difficult tumour sites like the kidney, liver, pancreas, rectum and oesophagus.
The MRI linac systems will be placed in a new Centre for Image guided Oncological Interventions, a close collaboration between Radiotherapy and Radiology. The equipment involved in this new Center and the intended patient categories will be discussed.

281 INVITED

Scanned Intensity − Modulated Proton Therapy

Abstract not received

282 INVITED

Laser-Accelerated Proton Therapy

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Considering their interaction with matter beams of protons and light ions should have the potential for increasing the curing rate in radiotherapy. Their physical advantages over conventional therapeutic radiation modalities (ultrahard bremsstrahlung and electrons delivered by medical electron linear accelerators) lead to reduced normal tissue dose and to the possibility of dose escalation within the tumour volume. Additionally light ions show an increased relative biological effectiveness (RBE) at the end of their track, which can be confined to the tumour volume, if an appropriate beam delivery technique (pencil beam scanning) is applied. Up to now these advantages of particle beams could not be translated into improved cure rates for most of tumour species.
For this situation three reasons are relevant: (i) Treatment and quality assurance techniques applied to particle therapy have been adopted from conventional radiation therapy. This is not adequate, since the dose distributions of particle beams are much less robust against minor inaccuracies in the treatment workflow than those of photons. (ii) The number of patients treated worldwide at technological optimal devices in clinical studies of high quality is still low. (iii) The reasons outlined under (i) and (ii) are primarily caused by the high investment and operating costs of particle therapy facilities, which exceed those of conventional facilities by about one order of magnitude.
This situation has led to intensive research on compact acceleration and beam delivery concepts. These include superconducting, dielectric wall and laser driven accelerators. The latter may have the highest potential for miniaturizing particle therapy devices. However, before a clinical prototype will become realistic, several physical, technological and biomedical problems have to be solved requiring intensive research on: (i) high power lasers ($P > 1$ PW) of high repetition frequency ($f > 10$ Hz); (ii) radiator targets, which efficiently convert the laser light into high energy protons ($E > 200$ MeV); (iii) dedicated techniques of dosimetry and quality assurance, which fit to the unusual time structure and pulse dose rate of laser accelerated beams; (iv) comprehensive characterization of the RBE of this novel radiation type via in in-vitro and in-vivo experiments; (v) reduction of the overall size of the irradiation facilities by the combination of laser acceleration and compact beam deliveries.

Keynote Lecture (Mon, 26 Sep, 11:30−12:15) **How Registry Data Has Changed Rectal Cancer Treatment**

283 INVITED

How Registry Data Has Changed Rectal Cancer Treatment

Abstract not received

Special Session (Mon, 26 Sep, 13:15−14:15) **How Should We Treat Good Risk Prostate Cancer − Focally or Entirely?**

284 INVITED

Active Surveillance

Abstract not received

285 INVITED

Brachytherapy − High Dose Rate or I-125?

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Brachytherapy provides the ultimate tool for customising dose distributions within the prostate gland. Low dose rate (LDR) seed brachytherapy with I − 125 or Pd-103 is well established as an effective treatment for good risk prostate cancer with biochemical control rates and survival equivalent to that of the other major modalities of treatment in this setting. Currently high dose rate (HDR) brachytherapy is used to boost higher risk patients enabling dose escalation in that setting and does not have a established role in low risk patients, although there is increasing evidence that HDR monotherapy is an effective treatment with low toxicity in this group of patients.
The convention for both LDR and HDR is to define the clinical target volume by the capsule of the prostate gland and a variable margin encompass potential microscopic extra capsular extension, typically 3−5 mm. Focal treatment requires accurate definition of the dominate lesion or lesions to be ablated. This may be mapped using biopsies or using functional imaging.
Biopsy mapping can be used for LDR brachytherapy transposing the position of the dominant lesion onto the ultrasound images used for