Paediatric solid tumours being highly cellular makes DWI attractive. Several studies have demonstrated the feasibility of DWI outside the CNS. In our initial observations (Radiology 2007;245:848−54) we described a significant relation between the tissue cellularity as measured histopathologically, and in vivo ADC. A possible hypothesis was therefore that DWI is a tool for assessing chemotherapy response in solid tumour by observing ADC over time.
Initially we followed a cohort of nephroblastoma patients in our institution with MRI at diagnosis and after six weeks' chemotherapy. The whole volume of all tumours was post processed to provide separate distributions of ADC values before and after chemotherapy. Independently, the histopathological slides were reviewed in accordance with SIOP Wilms-2001. I this pilot we have indeed seen a clear pattern suggesting that tumours that are differentiating, regressive or necrotic shift significantly towards higher ADC values following chemotherapy, whereas tumours that are triphasic or blastematous following chemotherapy do not show such a shift.
The results, although preliminary, are very promising, and deployment as part of future trials should be considered since this may be a unique window for response assessment that is independent of tumour size.

217 INVITED

Detecting tumor responses to treatment using magnetic resonance imaging and hyperpolarized spectroscopy

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Patients with similar tumor types frequently have markedly different responses to the same therapy. The development of new treatments would benefit significantly, therefore, from the introduction of imaging methods that allow an early assessment of treatment response in individual patients, allowing rapid selection of the most effective treatment. We have been developing methods for detecting the early responses of tumors to therapy [1]. This has included a targeted MRI contrast agent for detecting tumor cell death [2] and MR imaging of tumor metabolism using hyperpolarized C-13-labeled cellular metabolites. Nuclear spin hyperpolarization techniques can increase sensitivity in the MR experiment by >10,000x. This has allowed us to image the location of labeled cell substrates and, more importantly, their metabolic conversion into other metabolites. We showed that exchange of hyperpolarized C-13 label between lactate and pyruvate, in the reaction catalyzed by the enzyme lactate dehydrogenase, could be imaged in tumors and that this flux was decreased in treated tumors undergoing drug-induced cell death [3]. We have also shown that tissue pH can be imaged from the ratio of the signal intensities of hyperpolarized C-13-labeled bicarbonate and carbon dioxide following intravenous injection of hyperpolarized C-13-labeled bicarbonate [4]. The technique was demonstrated with a study on a mouse tumor model, which showed that the average tumor pH was significantly lower than the surrounding tissue. Since bicarbonate is already used intravenously in humans, we propose that this technique could be used clinically to image disease and response to treatment.

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Society session (Wed, 23 Sep, 09:00−11:00)
ESSO session − How to manage the patient who presents with stage IV colorectal cancer

219 ESSO Award

How to manage the patient who presents with stage IV colorectal cancer. The role of the colorectal surgeon

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Thirty percent of the patients with primary colorectal cancer presents with synchronous distant metastases. In the majority of cases the liver is the target organ but lung and peritoneum are the other frequently involved organs. This percentage might even increase with the availability of modern imaging techniques in the preoperative workup.
Several aspects are important to define the optimal strategy. This is determined by the presence of symptoms of the primary tumor, the estimation of resectability of both the primary tumor and metastases and finally the condition of the patient.
The colorectal surgeon should be in the lead of the multidisciplinary team making decisions about the right sequence of treatment options. Presently there is no standard therapy although removal of the primary tumor followed by systemic treatment was considered standard in the past.
There is a big difference in the approach between colon and rectal tumors. The first one presents often with obstruction making immediate surgery necessary and the latter one often has a threatened endopelvic fascia making primary surgery without preoperative chemoradiation not feasible.
With the availability of effective chemotherapeutic agents induction chemotherapy has become attractive in the last years. This induction chemotherapy is also used in selection of patients since progressive disease under chemotherapy is a poor prognostic sign. After a good response of the metastases and primary tumor it is attractive to resect the liver metastases first [1,2].
Our group conducts a phase II study in which after a short course radiotherapy (5 times 5 Gray) the treatment is followed by induction chemotherapy (including monoclonal antibodies). After 2−4 cycles a plan is made to treat liver and primary tumor at the same time. If this is not feasible a choice is made to treat either the liver first or the primary tumor, the second procedure is performed after a period of 2−3 months. Initial data show a high response rate and a high percentage of radical resections. This aggressive approach is also justified in patients with synchronous carcinomatosis peritonei [3].
On the other hand if both primary tumor and distant metastases are not resectable systemic treatment only is a valuable option [4].
In summary. As long as metastatic diseases and primary tumor are resectable neoadjuvant systemic treatment followed by radical resection of all tumor sites is advisable. Outcome is similar as in Stage III cases. If incurable disease is present the necessity of surgery should be carefully evaluated.

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221 INVITED

The role of the radiation oncologist

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In the last two decades we have seen major advances in the way patients with rectal cancer are investigated and treated. European investigators have continued to test important questions in the framework of randomised phase III trials with a specific focus on the role of adjuvant radiotherapy. In the last nine years at least seven European phase III trials evaluating the role of adjuvant radiotherapy in rectal cancer have been published. From these trials, we have an evidence base that demonstrates the efficacy of both short course pre-operative radiotherapy and pre-operative concurrent chemo-radiotherapy. Recent data from the Uppsala group have shown that short-course radiotherapy and delayed surgery in T4 tumours based upon MRI-staging also results in a chance of R0 resection, indicating that down-sizing will occur after this treatment regimen and allowing in the meantime an up-front chemotherapy before surgery. There is a paucity of studies that address specific translational questions within the framework of rectal radiotherapy trials. There is an urgent need to prospectively evaluate markers of both efficacy and toxicity with respect to both radiotherapy and concurrent chemotherapy agents. Many of these approaches are underway or planned but it is of paramount importance that future research studies