Material and Methods: A grid consisting of an 8 cm-thick Pb block containing cylindrical holes was constructed & dosimetry evaluated. Once attached to the head of a linac the multiple pencil beams project 1.3 cm diameter circles with centres 1.8 cm apart at the isocentre. The grid boost consisted of a single fraction of 15 Gy delivered by a direct field with 10MV photons followed the next day by 36 Gy/12#s/2.5 weeks. Acute & late toxicity was assessed using RTOG criteria.
Results: All 10 patients successfully completed the treatment protocol with no delays. The median follow up was 4 months (range 2−24 months). No grade 3/4 acute toxicities were recorded. A temporary sieve like pattern of skin erythema was noted over the grid field in 7 patients. Two patients developed grade 2 lung toxicity with moderate symptomatic fibrosis but no other late effects were observed. 71.4% of patients with chest pain had a sustained CR, with the remaining 28.5% achieving a good PR. 3 pancoast tumour patients with severe pain restricting arm abduction & chest wall numbness had complete responses by week 4. On imaging, 9/10 patients had a good PR in their lung primary, sustained till the end of follow up.
Conclusions: The megavoltage grid has enabled us to dose escalate safely in the palliative setting without any significant acute or late morbidity despite the large single dose delivered. It is an exciting new concept that warrants further research.

References

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946 POSTER

Flavopiridol enhances radiosensitivity of human laryngeal and lung cancer cells through enhancing radiation-induced apoptosis

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Background: The purpose of this study is to characterize the radiosensitizing effects of flavopiridol and investigate its mechanism of action on human laryngeal and lung cancer cells.
Methods: Human laryngeal squamous cell carcinoma cell line AMC-HN3 and human lung cancer cell line NCI-H460 were used. The cultured cells were exposed to radiation, flavopiridol, or combinations of radiation and flavopiridol. In combination treatment, 100 nM concentration of flavopiridol was administered simultaneously with irradiation, and the media was replaced after 24 hours. Irradiation was administered with 4 MV X-rays generated by a linear accelerator (Clinac 4/100, Varian). Clonogenic survival was measured using a clonogenic assay. Surviving fraction (SF) of flavopiridol-treated cells was compared with that of flavopiridol-untreated cells. Analysis of cell cycle distribution and measurement of apoptosis were assessed by flow cytometry. Western blotting of cleaved caspase-3, cleaved PARP [poly(ADP-ribose) polymerase], p53, p21, cyclin D1 and phosphorylated Akt was carried out.
Results: Simultaneous flavopiridol and radiation treatment enhanced radiation-induced cell killing in both cell lines. SF2 values of flavopiridol-treated cells were significantly lower than those of flavopiridol-untreated cells. The sub-G1 fractions of cells treated with flavopiridol and irradiation was higher than those of cells treated with flavopiridol or irradiation alone. The degree of caspase-3 activation and PARP cleavage was also increased by combination treatment. Cyclin D1 protein expressions were downregulated by flavopiridol in both cell lines.
Conclusion: Flavopiridol enhanced radiosensitivity of human laryngeal and lung cancer cells through increasing apoptosis.

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Target volume reduction in the treatment of malignant meningioma by boron neutron capture therapy

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Background: Boron neutron capture therapy (BNCT) is based on the nuclear reaction that occurs when boron is irradiated with thermal or epithermal neutrons to reduce high linear energy transfer alpha particles and recoiling Li nuclei. This is a binary approach: A ^{10}B-labeled compound delivers high concentrations of ^{10}B to the target tumor, relative to the surrounding normal tissues. BNCT is tumor cell selective particle radiation therapy. Therefore if sufficient quantities of boron compounds can be made to accumulate selectively in tumor tissues, this BNCT becomes an ideal radiotherapy. We have reported the clinical experience of malignant meningioma (MM) patients treated with BNCT. In our protocol, we used simultaneously 100 mg/kg of sodium borocaptate (BSH) and 500 mg/kg of boronophenylalanine (BPA), whose accumulation mechanisms differ from each other. However, it has not reported the basic study of BNCT for MM. In this study, we reported the efficacy of BNCT using human MM cell line.
Materials and Methods: A human MM cell line, f5, and a cell line of human glioblastoma, U87 cells were inoculated subcutaneously into the athymic nude mice. Ten days after cell implantation, six mice of each cell were injected 100 mg/kg of BSH for 6 hr and 500 mg/kg of BPA for 4 hr. After the injection, they were sacrificed and organs were excised. Boron concentration of each organ was determined with the ICP-AES. Other mice were transported to the reactor (JRR4) ten days after the implantation, and randomized on the basis of tumor size, into the experimental groups of 3−5 animals. This experiment included untreated controls. Mice were irradiated for 30 min after 100 mg/kg of BSH for 6 hr administration and 500 mg/kg of BPA for 4 hr administration. After BNCT, mice remained JRR4 for observation and tumor size was measured.
Results: After injection of combination BPA and BSH, the boron concentrations of f5 and U87 was 8.86 ug/g and 9.24 ug/g and Tumor to Blood ratios were 4.24 and 4.42. 35 days after tumor implantation, the mean tumor volume of U87 in BNCT group was 1354 cm^2 in comparison to that of non irradiated group 3540 cm^2. And that of f5 was 826 cm^2 in comparison to 2064 cm^2.
Conclusion: BNCT with BPA and BSH displays growth-inhibitory effect on both glioblastoma and MM.

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Realizing the paperless and filmless environment in a large radiation oncology "cyber-department"

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Background: Provision of reliable, efficient resource management in today's radiation oncology requires support for a vast flow of information.
Methods: A strategy of incremental implementation was developed so as to minimize disruption to care and optimize staff expertise and adoption. User committees were formed at all stages to provide direction. The hardware infrastructure pertinent to radiotherapy activities was designed to optimize patient safety and department efficiency. We designed and built a non-clinical lab system to commission all treating software systems and upgrades.
We began with basic schedule and verify/record functions, then proceeded to electronic prescriptions (and elimination of treatment sheets) to filmless treatment review and the integration of planning system and treatment data over a single network. All electronic procedures were phased into practice on a disease site basis, in tandem with adequate staff training. A custom radiotherapy order entry and workflow system, and a web-based tool to publish and approve treatment plans were built to support the treatment planning process, since no commercial packages existed to do these functions. Administrative reports were customized, as was support for case review conferences and quality assurance. An electronic content management intranet provides access to all department source documents and policies and schedules.
Results: In all patient operations paper has been eliminated. All treatments and assessments are recorded electronically and costs per image are now close to zero despite the large increases in the number of images generated for planning and treatment. There has been no significant downtime despite some external interruptions. Function is available throughout the centre and from remote locations. Communication, commitment, and careful analysis of workflow process are essential to success. We encountered many challenges, which may be of interest to others engaged in this transformation.
Conclusions: The department is now almost entirely electronic. All radiotherapy functions are supported electronically throughout the centre and from remote locations. Communication, commitment, and careful analysis of workflow process are essential to success. We encountered many challenges, which may be of interest to others engaged in this transformation.

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Early adverse reactions after hemibody irradiation (HBI)

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Background: The most strenuous symptom of cancer patients suffering from multiple bone dissemination is pain. Quality of life (QL) of these