and low anterior neck (50 Gy /25 #). The highest grade of mucositis assessed according to RTOG criteria and the time to development of that grade (in weeks since initiation) where noted in the data. The baseline characteristics of the patients utilized for the study are displayed in the table attached. All the statistical analysis was done using SPSS version 16.0.(table attached).

Results: Of the analysed 122 patients , 44.4 % vs 59.3 % developed RTOG Grade 3 or4 mucositis after morning vs evening RT, respectively (p = 0.10) and the median time to development of severe mucositis was prolonged in the morning group (6 weeks vs 5 weeks). Morning RT was also associated with significantly lesser no of patients for whom treatment had to be interrupted due to severe mucositis 17.5 % vs 40.7 % (**p = 0.005**). 58.2% of the patients who smoked (n =55) during RT , developed Grade 3 or 4 mucositis compared to 46.3 % who didn't smoke .(p = 0.396) Concurrent chemotherapy was associated with 65.2 % Grade 3 or 4 mucositis compared to 35.7 % of patients who didn't receive concurrent chemotherapy. (**p= 0.001**)

Conclusions: Our analysis has shown a decrease in the development of severe mucositis when RT is delivered in the morning hours when compared to evening , though not statistically significant .The patients able to complete the RT course, without any interruptions , due to severe reactions were significantly higher in the morning session compared to evening . Advanced head and neck malignancies are still a difficult proposition to treat and hence limiting normal tissue toxicity is critical . The circadian rhythm of the cell cycle progression and its radiobiological potential need to be studied in detail.

PO-1074

Vertebrate model to examine the biological effectiveness of different radiation qualities

E. Szabo[1], R. Kovács[2], I. Plangár[3], T. Tokés[4], R. Polanek[1], S.Z. Czifrus[5], D. Bencsik[2], K. Hideghéty[6]

[1]ELI-HU Nonprofit Kft., Biomedical Application, Szeged, Hungary

[2]Institute of Aquaculture and Environmental Safety, Szent István University of Gödöllo, Gödöllo, Hungary

[3]Hungarian Academy of Sciences-Semmelweis University, National Brain Research Programme Cognitive Translational Behavioral Pharmacological Research group, Budapest, Hungary

[4]Institute of Surgical Research, University of Szeged, Szeged, Hungary

[5]Institute of Nuclear Techniques, Budapest University of Technology and Economics, Budapest, Hungary

[6]Albert Szent-Györgyi Univerity of Medicine, Department of Oncotherapy, Gödöllo, Hungary

Purpose/Objective: Several feature of zebrafish are making them amenable for investigation on therapeutic approaches such as ionizing radiation. The establishment of zebrafish model for comprehensive radiobiological research stands in the focus of our investigation, comparing the radiation effect curves of neutron and photon irradiation. Our final aim is to develop an appropriate vertebrate model in order to investigate the relative biological effectiveness of laser driven ionizing radiation.

Materials and Methods: After careful dosimetry series of viable zebrafish embryos were exposed to a single fraction whole-body neutron-irradiation (1,25; 1,875; 2; 2,5 Gy) at the research reactor of the Technical University of Budapest and to conventional 6 MeV photon beam at 24 hour post-fertilization (hpf). The survival and morphologic abnormalities (pericardial edema, spine curvature) of each embryo were assessed for each experiment at 24-hour intervals from the point of fertilization up to 168 hpf (defining the dose lethal for 50% (LD_{50})).

Results: In the zebrafish embryo model LD_{50} at 20 Gy dose level was defined and the same lethality were found at 2 Gy dose from the reactor neutron beam resulting RBE of 10. Dose-dependent organ perturbations were detected on macroscopic (shortening of the body length, spine curvature, microcephaly, micro-ophthalmia, micrognathia, pericardial edema, and inhibition of yolk sac resorption) and microscopic (marked cellular changes in skin, cardiac, gastrointestinal system) with the same magnitude of dose difference.

Conclusions: In our observations we found that zebrafish embryo model can be used for investigating the effects of different type of ionizing radiation and this system proved to be highly efficient vertebrate model for preclinical examinations.

PO-1075

Endothelial microparticles: a marker of ECs activation during radiotherapy or radiochemotherapy of HNC patients?

E. Sierko[1], M.S. Monika Sokol[2], J.K. Joanna Kruszewska[3], D.H. Dominika Hempel[1], A.L. Anna Lipska[2], P.R. Piotr Radziwon[2], M.Z.W. Marek Z. Wojtukiewicz[1]

[1]Medical University Bialostockie Centrum Onkologii, Department of Oncology, Bialystok, Poland

[2]Regional Centre for Transfusion Medicine Bialystok Poland, Regional Centre for Transfusion Medicine Bialystok Poland, Bialystok, Poland

[3]Medical University of Bialystok Poland, Department of Oncology, Bialystok, Poland

Purpose/Objective: It has been reported that blood endothelial microparticles (EMP) contribute to blood coagulation activation, angiogenesis and inflammation as well are marker of endothelial cells (ECs) activation and/or apoptosis in various clinical settings. During radiotherapy (RT) or radiochemotherapy (RCT) of head and neck cancer (HNC) patients acute radiation reaction appears which is associated with ECs activation. However, information on EMP in HNC patients during RT/RCT is lacking. The aim of the study was to assess if EMP are a marker of ECs activation and damage as a result of ionizing radiation during the process of RT/RCT of HNC patients.

Materials and Methods: Blood samples obtained from HNC patients undergoing radical RT/RCT (before, 1 day and 3 months after its cessation) and from healthy control subjects were prospectively examined. Endothelial microparticles were measured by flow cytometry. The monoclonal antibodies purchased from Becton Dickinson, USA were used in the study: CD31 stained FITC, CD62E stained APC, PE-Cy5 labeled anti-human CD42b, PE labeled anti-human CD142 and kappa isotype control: FITC labeled mouse IgG1, APC labeled

mouse IgG, PE-Cy5 labeled mouse IgG1 and PE labeled mouse IgG1.

Results: Endothelial microparticles were significantly elevated in patients with HNC patients (CD31+/CD62E+/CD42b-: mean 1601±1479 EMP/μl; CD31+/CD142+/CD42b-: mean 121±135 EMP/μl) compared with control group (CD31+/CD62E+/CD42b-: mean 782±698 EMP/μl; CD31+/CD142+/CD42b-: mean 688±647 EMP/μl). The concentration of EMP were not notably increased as result of RT/RCT (CD31+/CD62E+/CD42b-: mean 1629±769; EMP/μl;CD31+/CD142+/CD42b-: mean 1257±603 EMP/μl). There were no significant differences between EMP level before treatment, one day and 3 months after radiation cessation. Furthermore, there was no significant difference in plasma EMP level in plasma of the HNC patient undergoing RT alone, RT combined with chemotherapy, postoperative RT or postoperative RCT.

Conclusions: The data suggest that the release of EMP is not a marker of ECs activation as a result of early response to ionizing radiation during RT/RCT in HNC patients.

Poster: Radiobiology track: Predictive assays/prognostic factors

PO-1076

Unsupervised clustering in gene expression profiling to make prognosis for malignant gliomas

B. Yang[1], W.W. Lam[1], K.Y. Cheung[1], S.K. Yu[1]
[1]*Hong Kong Sanatorium & Hospital, Medical Physics and Research Department, Happy Valley, Hong Kong (SAR) China*

Purpose/Objective: Prediction of the treatment response and overall outcome in patients is an important goal in radiation oncology. We aim to identify prognostic molecular features using gene expression profiling in gliomas.

Materials and Methods: Data from [1] were used in this study. Total 152 samples including 100 glioblastomas, 21 anaplastic astrocytomas, 19 diffuse astrocytomas and 12 anaplastic oligodendrogliomas were selected for analysis and 3456 genes expressed in gliomas, including 3012 unique sequences plus an additional 444 genes from a literature survey were identified. Different from using a selected training set in [1], the total 152 samples were included in our study. Progression-free survival (PFS) period was adopted as the clinical parameter for the treatment response. Pearson's linear correlation coefficients between the gene data and PFS record were computed for selecting the candidate genes for prognosis model. Hierarchical clustering was then computed based on the expression profile of selected genes. Cox proportional hazards regression was used to calculate the hazard ratios between different groups.

Results: 47 genes are selected for our prognosis model and we have 29 genes in common with results in [1]. The unsupervised hierarchical clustering allows us to cluster the 152 patients into three distinct groups based on their similarities measured over those selected 47 genes. The results of Kaplan-Meier analysis for all patients show PFS probabilities after 5 years are 70.2%, 0% and 25.7% for group 1, 2 and 3 respectively. The cox proportional hazards regression analyses show hazard ratios 23.0, 8.8 and 0.6 for group 1&2, group 1&3 and group 2&3 respectively. The same method is also applied on the non-glioblastoma patients, which are able to be clustered into two groups with PFS probabilities after 5 years 76.0% and 0% for group 1 and 2 respectively. The hazard ratio is calculated to be 25.5.

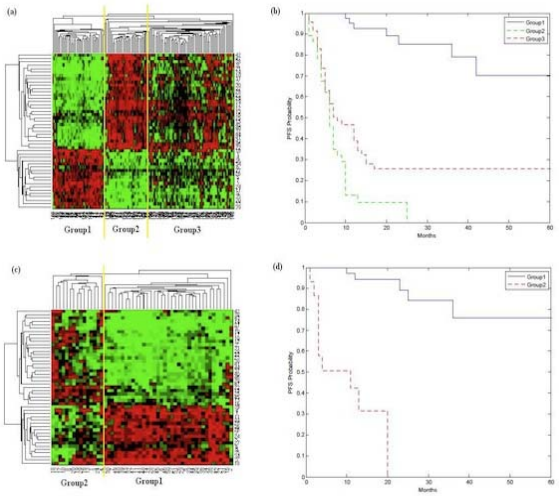

Fig. 1 (a)-(b) Heatmap and Kaplan-Meier plot for all patients; (c)-(d) Heatmap and Kaplan-Meier plot for non-glioblastoma patients.

Conclusions: In our analyses, the selected profiling results are useful in constructing a classification scheme and the unsupervised clustering method also succeeds in dividing the samples into good and poor prognosis groups. Compared with the results in [1], the good prognosis group in our result has higher PFS probabilities after 5 years and the unsupervised method is direct and easy to prevent the possible bias in the selection of training set in the supervised method.

[1] M. Shirahata, S. Oba, K. Iwao-Koizumi, S. Saito, N. Ueno, M. Oda, N. Hashimoto, S. Ishii, J. A. Takahashi and K. Kato, *Cancer Sci*, 100: 165-172

Poster: Radiobiology track: Others

PO-1077

Comparison of in vivo and theoretical assessment of radiation-induced DNA damage

M. Ebert[1], B. Dahl[2], J. Prunster[2], N. Zeps[3], B. Reniers[4], F. Verhaegen[5], C. Saunders[6], M. House[2], D. Joseph[7]
[1]*Sir Charles Gairdner Hospital, Academic Physics, Perth Western Australia, Australia*
[2]*University of Western Australia, Physics, Perth Western Australia, Australia*
[3]*St John of God Hospital, Pathology, Subiaco Western Australia, Australia*
[4]*Maastro Clinic, Medical Physics, Maastricht, The Netherlands*
[5]*Maastro Clinic, Radiotherapy Physics, Maastricht, The Netherlands*
[6]*University of Western Australia, Surgery, Perth Western Australia, Australia*
[7]*Sir Charles Gairdner Hospital, Radiation Oncology, Perth Western Australia, Australia*