All measured values were evaluated using the gamma index with dose difference/distance-to-agreement criteria of 3%/2 mm ($\gamma_{3/2}$) for the area receiving more than 10% isodose as compared with a static pattern. A $\gamma$ passing rate $> 90\%$ was considered acceptable in this study.

**Results:** For Group A, $\gamma_{3/2}$ was less than 90% for translational errors $\geq 3$ mm in the LAT and VRT directions and $\geq 2$ mm in the LNR direction. For Group B, $\gamma_{3/2}$ was less than 90% for rotational errors $\geq 3^\circ$. Table 2 summarizes $\gamma_{3/2}$ for Group C. Translational errors of 2 mm and rotational errors of $2^\circ$ always gave a $\gamma_{3/2}$ of less than 90%. $\gamma_{3/2}$ was less than 90% for tilt and roll angles of $2^\circ$, even without translational errors. Even when translational errors were 1 mm, $\gamma_{3/2}$ was less than 90% for two patterns with rotational errors of $1^\circ$. By correcting the translational errors, $\gamma_{3/2}$ was more than 90% for tilt and roll angles of $1^\circ$. Note that correction of the translational errors degraded $\gamma_{3/2}$ for the pattern with a tilt angle of $1^\circ$ and roll angle of $-1^\circ$ and with a tile angle of $2^\circ$ and roll angle of $-2^\circ$.

**Conclusions:** This study have demonstrated that rotational errors $\geq 3^\circ$ in either angle or $\geq 1^\circ$ in multiple angles most likely gave a $\gamma_{3/2}$ of less than 90%, even with translational errors $< 2$ mm; therefore, it is preferable to correct rotational errors $< 2^\circ$ in each angle for spine SRS under correction of translational errors.

**Symposium with Proffered Papers: Future directions for HPV negative head and neck cancer**

**SP-0532**

Molecular imaging of proliferation and hypoxia

J.H. Kaanders1, B.A. Hoeben1, J. Bussink2, W.J. Oyen2
1Radboud University Medical Center, Radiation Oncology, Nijmegen, The Netherlands
2Radboud University Nijmegen Medical Centre, Radiation Oncology, Nijmegen, The Netherlands

HPV-status has been recognized as the strongest prognostic indicator for treatment outcome of oropharynx cancer overpowering clinical and other biological tumor characteristics. Nevertheless, the latter remain of value for selection of subgroups within the HPV-negative and HPV-positive entities that qualify for treatment intensification or de-intensification, respectively. Among the clinical factors are smoking habits and T- and N-stage. Classical radio- and chemotherapy resistance mechanisms include DNA-repair capacity, tumor repopulation and hypoxia, for which various biomarkers have been identified. To improve the outcome of HPV-negative patients the challenge is to identify the pivotal resistance mechanisms and appropriate treatments to counteract them. There will not be a "one-size-fits-all" solution and customized treatment additions and/or adaptations will be essential, necessitating selection tools.

For a biomarker assay to be successful for wide clinical application it should preferably be non-invasive, fast, not too complex, and suited for repetitive assessments. PET-scanning meets these criteria although specific tracer availability can be a limitation. The current status and future directions of PET-scanning with proliferation- and hypoxia-specific tracers for outcome prediction and early response assessment will be discussed.

**SP-0533**

Combined modality treatment: risk-adapted intensified strategies and quality of life

C. Nutting8
1The Royal Marsden NHS Foundation Trust, Radiotherapy, London, United Kingdom

HPV negative head and neck cancer remains a challenging disease with a poor prognosis for many patients, especially those with locally advanced disease stage. Future developments are likely to focus on a number of areas. Techniques to identify and target patients with radiosensitive disease are required. Current clinical trials in this area are testing radiation dose escalation to overcome radioresistance. Advances in functional imaging have allowed the detection of sub-volumes of radiosensitive tumour tissue due to hypoxia, proliferation or other processes. Dose painting techniques are in development to attempt to deliver increased radiation dose to these areas. In parallel the development of combinations of radiation with chemotherapy and novel agents are underway. The ability of agents to overcome the processes leading to radioresistance such as hypoxia, DNA damage repair and other processes will be discussed.

**OC-0534**

An RCT on the value of postoperative accelerated radiotherapy in squamous cell head and neck cancer: final results

1University Medical Center Groningen University of Groningen, Radiation Oncology, Groningen, The Netherlands
2Radboud University Nijmegen Medical Centre, Radiation Oncology, Nijmegen, The Netherlands
3VU University Medical Center, Radiation Oncology, Amsterdam, The Netherlands
4MAASTRO, Radiation Oncology, Maastricht, The Netherlands
5Dr. Bernard Verbeeten Instituut, Radiation Oncology, Groningen, The Netherlands
6University Hospitals Leuven, Radiation Oncology, Leuven, Belgium
7VU University Medical Center, Radiation Oncology, Amsterdam, The Netherlands
8The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital, Medical Statistics, Amsterdam, The Netherlands

Purpose/Objective: In head and neck squamous cell carcinoma (HNSCC), the overall treatment time of radiation (OTT) is significantly associated with locoregional control (LRC), which is consistent with rapid repopulation of cancer clonogens during radiotherapy. However, the importance of
the OTT in the postoperative setting is less clear. Therefore, the main objective of this phase III study was to determine the value of reduction of the OTT of postoperative radiotherapy in high risk patients primarily treated with surgery.

Materials and Methods: Patients with HNSCC treated with curative surgery and with high risk factors for locoregional recurrence (i.e., positive surgical margins and/or extranodal spread) were randomly assigned to receive either conventional postoperative radiotherapy (CON-RT) at 2 Gy/fraction/day, 5 days/week to 66 Gy/33 fractions/7 weeks or postoperative accelerated radiotherapy (POPART) with 2 Gy/fraction/day, 5 days per week, to 20 Gy followed by 1.8 Gy/fraction/day and 1.3 Gy/fraction per day to a boost field as a second daily treatment to 66.5 Gy/40 fractions/5 weeks. The primary endpoint was locoregional tumor control (LRC). Secondary endpoints were overall survival (OS), progression-free survival (PFS), acute and late toxicity and quality of life.

Results: From November 2004 to August 2009, 148 patients were enrolled in the study (74 pts for CON-RT and 74 pts for POPART). The median follow up time was 6.2 years. The two study-arms were well balanced with regard to the most important prognostic factors. No significant differences were noted with regard to acute and late toxicity, although there was a trend towards more use of pain medication among patients treated with POPART. At 3 years, the LRC rate was 76.5% (95% CI: 67.0-87.4) after POPART compared to 74.2% (95% CI: 64.6-85.0) with CON-RT (HR: 0.75, CI 0.40-1.14; p=0.39). No difference was found with regard to PFS (p=0.16) with a HR of 0.74 (95% CI: 0.49 - 1.13). The medians were 42.6 (95%CI: 31-78.3) months for CON-RT and 60.5 (95%CI: 34.6-NA) for POPART. The DFS probability at 8 years was 43.8% for CON-RT (95% CI: 33.8-57.0) and 51% POPART (95% CI: 40.7-63.8). No statistical difference was noted in the long term between the two arms. The 8-year overall survival rate was 46.0% with POPART compared to 33.1% with CON-RT (HR:0.82, CI 0.53-1.28; p=0.39).

Conclusions: A reduction in the OTT of postoperative radiotherapy in patients with HNSCC with adverse factors for locoregional failure does not improve outcome in terms of LRC, PFS and OS.

OC-0535
A prospective multi-center study of plasma EBV DNA monitoring in nasopharyngeal carcinoma
1Taichung Veterans General Hospital, Department of Radiation Oncology, Taichung, Taiwan
2Hung Kuang University, Department of Nursing, Taichung, Taiwan
3Yuan’s General Hospital, Department of Radiation Oncology, Kaohsiung, Taiwan
4National Cheng-Kung University Hospital, Department of Radiation Oncology, Tainan, Taiwan
5Kaohsiung Medical University Hospital, Department of Radiation Oncology, Kaohsiung, Taiwan
6Taipei Medical University Hospital, Department of Radiation Oncology, Taipei, Taiwan

Purpose/Objective: To investigate the clinical value of the plasma EBV DNA (pEBV DNA) assay in patients with nasopharyngeal carcinoma (NPC) after curative treatment. Materials and Methods: The inclusion criteria for this multi-center prospective study are (1) biopsy-proven NPC, (2) no distant metastasis, (3) finishing curative radiotherapy with 3 years, (4) no clinically detectable active diseases. pEBV DNA concentration is monitored every 3 months. Detailed staging workups are performed when abnormal pEBV DNA detected. All tumor recurrences are documented by imaging studies along with pathological verification if the lesions are accessible and patients agree.

Results: From August 2011 to December 2013, 441 patients were enrolled and 69 patients had abnormal pEBV DNA during follow-up visit. Sixty-three of 69 (91.3%) patients with elevated pEBV DNA have been proven as tumor relapse, whereas only 4 of 368 (1.1%) patients with normal pEBV DNA level are showing tumor relapse (P<0.001). In addition, most (60.3%) relapsed patients were detected in a symptomless state. Patients with elevated pEBV DNA during follow-up had significant worse overall survival than those with undetectable pEBV DNA (P<0.001).

Conclusions: pEBV DNA is a reliable biomarker in early detection of tumor relapse in post-treatment NPC patients monitoring with a very high positive predictive value (91.3%) and negative predictive value (98.9%).