

≥5 cc vs. 50%,  $p < 0.01$ ). There was no difference between HPV(+) and HPV(-) with respect to the presence of multiple GTV-N (69% vs 72%,  $p = 0.82$ ), involvement of level II (98% vs. 97%,  $p = 0.76$ ) or retropharyngeal nodes (12% vs 16%,  $p = 0.50$ ). Frequency of bilateral neck involvement was similar for all cases (35% vs. 39%,  $p = 0.57$ ), however, HPV(+) OPC not extending to midline had less bilateral GTV-N (9% vs. 36%,  $p = 0.013$ ). More LN had cystic appearance for HPV(+) OPCs (52% vs. 24%,  $p < 0.01$ ). **Conclusions:** HPV(+) OPC rarely arises beyond tonsil or base of tongue and more frequently has gross nodal involvement compared to HPV(-) OPC. Involved nodes tend to be larger and more often (though not exclusively) cystic than HPV(-). The number, level and laterality of involved nodes are similar between the two groups with the exception of relatively rare bilateral involvement in HPV(+) OPC without primary tumour midline extension.

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POSTER

### An Open, Multicenter Clinical Study of Cetuximab Combined With Intensity Modulated Radiotherapy Plus Concurrent Chemotherapy in Locally Advanced Nasopharyngeal Carcinoma

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**Background:** To evaluate the safety and efficacy of cetuximab combined with IMRT + concurrent cisplatin chemotherapy in patients with locoregionally advanced NPC in a Chinese multicenter clinical study.

**Methods:** Patients with primary stage III – IVb non-keratinizing NPC were enrolled. The planned dose of IMRT to gross tumour volume (GTV) was 66–75.9 Gy in 30–33 fractions. Cisplatin (80 mg/m<sup>2</sup>, q3week (w)) and cetuximab (400 mg/m<sup>2</sup> one w before radiation, and then 250 mg/m<sup>2</sup>/w) were given concurrently for 6–7 weeks. The response rate was evaluated according to RECIST 1.0, and adverse events (AEs) were graded according to CTCAE v3.0.

**Results:** From July 2008 to April 2009, 100 patients were enrolled. With a Medium follow-up time of 13.1 months, No patients withdrew from the study. With the exception of one patient who experienced a grade 3 acne-like skin rash which developed in the 4th cycle and which did not recover to grade 2 skin rash in two weeks. Actual median dose to GTV and positive cervical lymph nodes were 69.96 Gy and 68 Gy, respectively. Median dose of cisplatin was 133.17 mg/cycle. 99% of all included patients finished the planned treatment. No toxic deaths were observed during the treatment. AEs of this combined modality treatment mainly consisted of acneiform skin eruptions, dermatitis, mucositis, xerostomia, leucopenia and slight ALT elevations etc. Typical skin rash toxicity (grade 2/3) was observed in 64/100 patients (64%) mainly starting at the third week of cetuximab treatment. Only one patient had a mild infusion related reaction, which happened in the first week of cetuximab therapy. From the third week of radiotherapy, 58% and 90% of the patients began to suffer from grade 1 dermatitis and ≥ grade 2 mucositis, respectively, while grade 4 mucositis (spontaneous bleeding) was observed in 2% of the patients. 40% of patients experienced ≥ grade 2 xerostomia. Besides 2 cases of mucositis, no other grade 4 AEs were observed. Bone marrow suppression was mild, and only 8%, 4% and 5% patients had ≥ grade 2 decreased ANC, Plt and Hb, respectively. Locoregional control rate at 3 months after the stop of chemoradiotherapy was 100% (n = 93). With a median follow-up of 330 days, no local recurrence occurred (both nasopharyngeal site and positive lymph nodes) in any patient. Within the follow-up period, distant metastasis occurred in 4 patients (4%), out of these, 3 cases were lung metastasis. 5 patients died during the follow-up period (5%), 2 patients from tumour progression, 1 hemorrhage in nasopharynx, 1 hemorrhage in abdomen and 1 non-tumour related death.

**Conclusions:** The combined treatment modality of IMRT + concurrent chemotherapy + cetuximab in loco-regionally advanced NPC was well tolerated, with a very encouraging loco-regional control rate and metastasis-free survival rate at 1 year. Further investigation of this combination in treatment in Loco-regional NPC is warranted.

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POSTER

### Single Vocal Cord Irradiation – a Competitive Treatment Strategy in Early Glottic Cancer

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**Introduction:** The treatment of choice for early glottic cancer is still being debated. Although most groups agree that good local control (LC) can be obtained with both laser surgery or radiation therapy (RT), the treatment modality of choice ultimately relies on best functional outcome. In order to optimize the quality of voice, a novel 4D conformal technique for single vocal cord irradiation (SVCI) was designed.

**Material and Methods:** For reference purposes, the records of all patients with newly diagnosed squamous cell carcinoma of the vocal cord (164 T1a), treated between 2000 and 2008 in the Erasmus MC by RT only, were analyzed. All patients were irradiated to a total dose of 60–66 Gy, using conventional RT techniques (i.e. 6 MV wedged parallel-opposed photon beams, mean field sizes of ≤ 36 cm<sup>2</sup> [6x6], fraction sizes varying between 2–2.3 Gy). Patients were analyzed for local control (LC). The Quality of Life (QoL) was determined by the EORTC H&N 35 questionnaire (investigating dry mouth, swallowing problems & speech). Also the VHI (Voice Handicap Index), as well as the thyroid function status (measuring TSH [Thyroid stimulating hormone] blood levels), were established. Finally an on-line image guided SVCI technique was developed (Osman et al., R&O 2008).

**Results:** For the 164 T1a patients, a LC rate at 5-years of 93% and a VHI of 12.7 (0–63) was determined. Using the SVCI technique it was feasible to irradiate one vocal cord within 1 mm accuracy. This way, sparing of the contralateral (CL) vocal cord and CL normal tissues at risk (e.g. the strap muscles, constrictor inferior muscle, carotid arteries, thyroid gland, laryngeal cartilages and arytenoids), could be achieved.

**Conclusions:** This paper first analyzes T1a vocal cord lesions when treated by conventional P-O external beam RT techniques. Planning studies using on-line image guidance demonstrated the feasibility of irradiating a single vocal cord with significant sparing of the CL normal tissues at risk. First few patients using cone beam CT have been treated and results will be discussed (e.g. voice, VHI, clinical photographs). A feasibility study of using a Cyberknife with large fraction sizes for SVCI in case of T1a lesions (5x8.5 Gy, prescribed to 80% isodose in overall treatment time of 2 weeks), is currently underway. It is argued that SVCI is a save and competitive alternative to laser surgery.

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POSTER

### Dosimetry, Clinical Outcome and Quality of Life in Postoperative Image-guided Intensity Modulated Radiation Therapy in Sinonasal Cancer

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**Background:** This study is aimed to assess the dosimetry, clinical outcome and quality of life in patients of locally advanced sinonasal cancer undergoing surgery followed by adjuvant image-guided intensity modulated radiation therapy (IGIMRT).

**Materials and Methods:** We enrolled 5 patients (pts) of sinonasal cancer (stage III-IV, age ≤70 years, KPS ≥70, R0/R1 resection) for IGIMRT in a project. Clinical target volume (CTV) comprised high risk (HR) CTV: surgical bed and low risk (LR) CTV: retropharyngeal, level IB and II lymphnodal site (only in T3/T4 squamous or poorly differentiated carcinoma). An isotropic 3 mm expansion was given around CTV to generate planning target volume (PTV). Prescribed dose was 60 Gy/30#/6 weeks to HRPTV and 50 Gy/30#/5 weeks to LRPTV (simultaneous integrated boost). IMRT was planned by 7–9 coplanar equally spaced beams (step & shoot multileaf collimator) with 6 MV photons with dose prescribed at 95% isodose (Pinnacle TPS v8.0m). Treatment verification was performed with kilo-voltage cone beam CT (KVCBCT) on first 3 days of treatment and subsequently twice a week (Elekta Synergy S). Positional correction was done when translational error was >3 mm. Toxicity charting was done weekly using RTOG criterion. Quality of life was assessed pre-RT, immediate post-RT & 3 month post-RT using EORTC QLQ-C30 version 3 & QLQ-H&N35 module.

**Results:** The median age was 45 years with male: female ratio of 2:3. Primary site was nasal cavity-2 pts, maxilla-2 pts and ethmoid-1 pt (stage T4N0M0 in all). Histology was squamous, adenoid cystic and adenocarcinoma in 2, 2 and 1 pt respectively. Median D95 PTV was 58.75 Gy. Median conformity & homogeneity (D2/D98) indices were respectively 1.17 & 1.13. Median value of dose maximum to organs at risk (OAR) were- brainstem: 51.67 Gy, spinal cord: 33.66 Gy, optic chiasma: 54.45 Gy, optic nerve: 55.16 Gy (left) & 51.84 Gy (right), eye: 50.9 Gy (left) &

49.42 Gy(right), temporal lobe: 61.67 Gy (left) & 62.67 Gy (right). Median value of mean dose to OAR were- parotid: 16.21 Gy (left) & 19.78 Gy (right) & oral cavity: 28.62 Gy. Median number of KVCBCT done per patient was 10. Median translational error (cm) in x, y & z axis was 0.1, 0.19 & 0.15 respectively. Acute radiation morbidity included dermatitis: Gr1(60%) & Gr2(40%), mucositis: Gr2(80%) & Gr4(20%), salivary gland toxicity: Gr1(100%), conjunctivitis: Gr1(60%) & Gr2(20%), pharyngitis: Gr1(60%) & Gr2(40%). 3 months after completion of RT (median follow-up 10.5 months) all pts are disease free as assessed by clinical, endoscopic & radiological examination. Median global health status (QoL) declined from 83.33(pre-RT) to 75 (immediate post-RT) but recovered back to baseline value 3 months post RT. Symptom scores pertaining to pain, swallowing, sense organ dysfunction, social eating, mouth opening worsened immediately after RT (median -33.33) but gradually came back to baseline level (median -0) 3 months after RT.

**Conclusion:** Adjuvant IGIMRT in locally advanced sinonasal cancer permits precise delivery of radiation to the target with sparing of the adjacent dose-limiting OAR with favorable toxicity profile, excellent quality of life & promising early clinical outcome.

**8561** POSTER  
**Outcome of Squamous Larynx Cancer (LC) in Patients Aged >70 – a Mono-institutional Case-series Review**

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Conservative surgery (CS) is favoured in stage I and II. In advanced stages (III and IV) total or partial laryngectomy (TL) or in alternative organ preservation protocols including chemo-radiotherapy (CRT) are resorted to. Notably the concomitant use of chemo in addition to RT has no effect on survival with increasing age (Pignon J, Radioth Oncol 2009). Few data are available about LC management and outcome in patients aged ≥70.

**Methods:** We retrospectively reviewed the clinical records of unselected LC patients aged ≥70 curatively treated at our Institute from 2005 to 2010. Comorbidities were scored according to Adult Comorbidity Evaluation-27 (ACE-27) and the stage was revised according to AJCC VII<sup>o</sup> edition (2009). Overall survival (OS) curves were estimated with the Kaplan–Meier method. To study the association between mortality and prognostic factors (age, treatment, grade of comorbidity, tumour site and stage), we also applied univariable and multivariable relative survival regression models; this methodology allows adjusting for natural mortality, which largely affects OS in elderly, thus minimizing the impact of deaths for causes unrelated to LC.

**Results:** Seventy-eight pts (72M/6F) were identified (median age 74, range 70–88). Glottic cases were 50, supraglottic 20 and glottic-subglottic 8. At presentation primary tumours were 58, larynx recurrence 19 and 1 was a 2<sup>nd</sup> laryngeal tumour. Stage was I-II in 40 and III-IV in 38 pts. Thirty-one patients (40%) had comorbidities equal to or greater than A2. Thirty-three patients, 29 of whom with stage III and IV, were submitted to TL, followed by RT (10/33) or CRT (2/33); nine patients received a CS procedure (stage I and II in 8 cases); 29 pts were treated with RT (stage I and II in 27 cases); only 7 patients, all but one with stage III and IV, received CRT. With a median follow up of 29 months (interquartile range: 15–52), 25 patients (32%) experienced a relapse (13 T; 6 N; 5 M and T+M 1), 14 pts died (2 without disease) and 64 were still alive, 6 of whom with disease. Whole series 3-year OS was 82%.

**Relative survival analysis**

	Univariable			P	Multivariable			
	HR	CI min	CI max		HR	CI min	CI max	
Age (years), 78 vs 72	1.09	0.59	2.03	0.780	1.20	0.61	2.36	0.601
Tumour site								
Glottic-subglottic vs glottic	0.47	0.06	3.75	0.754	0.22	0.02	1.92	0.353
Supraglottic vs glottic	1.08	0.29	4.01		0.61	0.15	2.43	
Treatment								
TL vs CS	2.74	0.47	15.95	0.166	2.21	0.18	27.15	0.365
CRT vs CS	0.86	0.07	11.06		0.56	0.03	12.12	
RT vs CS	0.55	0.07	4.20		0.50	0.06	3.94	
Stage, III-IV vs I-II	3.67	1.01	13.37	0.049	1.99	0.28	14.43	0.494
Comorbidity, A2–A3 vs no comorbidity–A1	2.56	0.84	7.87	0.099	1.83	0.57	5.92	0.310

HR: hazard ratio, 95% CI confidence interval, P = p value at Wald test.  
 Legend: CRT includes in 6 cases (NB: 2 patients received induction chemotherapy before concomitant chemo-radiotherapy); one patient received induction chemotherapy followed by RT.

**Conclusions:** Chronological age, form of treatment, tumour site and comorbidities did not influence the oncologic outcome in this population.

Probably due to the limits of the analyzed series (retrospective review; patients selection along with the low number of patients) and to the high correlation between stage and treatment, stage failed to reach significance at multivariable analysis.

**8562** POSTER  
**Incidence of Radio-dermatitis in Head and Neck Cancer With 3D Conformal Radiotherapy and Prophylaxis With Topic Cream**

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**Background:** Radio-induced dermatitis is one of the most frequent side effects of radiotherapy, its estimated that between 80–90% of irradiated patients experience some degree of dermatitis. In head and neck cancer is the second most important toxicity behind mucositis, but there are not standardized guidelines for its prevention with topic cream and the effect of new planning techniques, and treatment. We evaluate the effectiveness of 3D conformal radiotherapy and topic use of a lotion containing 3% urea, polidocanol and hyaluronic acid for preventing the occurrence of acute radio dermatitis and evaluate its severity comparing with historical series treated with 2D technical for head and neck cancer.

**Materials and Methods:** Prospective observational study in 194 patients with head and neck cancer with 12-week follow up period between 2009 and 2010. Skin toxicity RTOG was evaluated weekly. We compared incidence and grade of toxicity with 300 head and neck cancer patients treated with 3D conformal radiotherapy in our centre during 2007–2008, and 150 patients treated during 1998, with 2D technical, both with skin support measures.

**Results:** The proportion of patients who didn't develop radiodermatitis was significantly higher in the lotion urea use group (24.2% vs 13.8% vs 2.3%; p < 0.05). The lotion urea use showed lower incidence of radiodermatitis (70.2% vs 83.7% vs 97.6%) and lower grade of toxicity (p < 0.05) and lower proportion of radiodermatitis grade 2 or higher (23.4% vs 51.3% vs 62.7%).

**Conclusions:** The use of urea 3% hydrating lotion during treatment and beginning three weeks before start radiotherapy, is an effective agents for the prevention of radiodermatitis in head and neck cancer patients, reducing the incidence of skin toxicity and lower incidence of radiodermatitis grade 2 or higher.

**8563** POSTER  
**Reirradiation in Head and Neck Tumours**

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**Background:** The treatment of choice for recurrences or second tumours of head and neck area, in areas previously irradiated surgery is not always feasible. The poor results obtained exclusive chemotherapy.

We have the objective to study treatment outcome in these tumours recurrent head and neck, previously irradiated.

**Material and Methods:** We evaluated 19 patients with recurrent disease, between 2005 to 2010. 6 larynx, 5 nasopharynx, 5 in oropharynx and three patients in oral cavity. The initial dose received between 50 and 70 Gy, 3/10 received radical radiotherapy, 2/10 radical chemoradiation; other adjuvant radiotherapy, of which 8/14 was combined with chemotherapy. In 4/19 nodal recurrence (N1-N2), local 15/19 (T2-T4). Reirradiation with external 3D conformal techniques and dose between 30 Gy and 70 Gy. Time between initial treatment and relapse: 11 to 72 months.

**Results:** 15/19 cases were complete response, 3/10 partial response, 1/19 stabilization. Toxicity: xerostomia (G2: 4/19, G3: 2/19), moderate fibrosis (6/19, a case trismus), 1 osteoradionecrosis fistula required surgical treatment. Local control: 80%, median survival one year and 50% 2 years free of disease, died of distant metastasis 35 months after second treatment.

**Conclusions:** This type of treatment, once considered contraindicated, after analyzing various jobs, the potential has not seen a high incidence of severe damage expected in healthy tissues.

Aggressive treatment of this disease recurring, allowing long survival, even in extensive disease is superior to best supportive care.