provide a more precise prognostication of survival for patients with OCSCC compared to TNM staging. Further investigation of these prognostic roles is merited to allow individual patient risk-stratification and may help in treatment decision and trial design.

81 IS A SHIFT IN THE STANDARD OF CARE CHEMOTHERAPY FOR PATIENTS WITH ESOPHAGEAL CANCER PRE-MATURE?
Queen's University, Kingston, ON

Purpose: To compare outcomes among patients with localized esophageal and gastro-esophageal junction (GEJ) cancer who received concomitant chemoradiation (CRT) using either cisplatin/5-FU or carboplatin/paclitaxel. CROSS trial demonstrated efficacy of carboplatin/paclitaxel in tri-modality setting. However this regimen has also been adopted as an alternate for patients receiving CRT as definitive treatment due to better tolerance.

Methods and Materials: Medical records of all patients diagnosed with localized carcinoma of esophagus and GEJ who underwent definitive CRT using cisplatin/5-FU, carboplatin/5-FU, or carboplatin/paclitaxel between January 2008 and March 2015 at our academic centre were reviewed.

Results: Seventy-five patients (79% male) were identified with a median age of 74 years (range 45-86). Most (66%) had an adenocarcinoma and 37% squamous cell carcinoma. Sixty-three percent had distal 1/3rd and/or GEJ tumour. 48% received cisplatin/5-FU, 35% carboplatin/paclitaxel and 17% carboplatin/5-FU. Most patients (99%) received 50Gy in 25 fractions. The median overall survival (OS) for cisplatin/5-FU group was 27 months (m) (95%CI 17-39) with three-year OS of 42%, in contrast to 14 m (95%CI 11-17) and 13% among patients received carboplatin/paclitaxel (log-rank p = 0.006). The median OS for carboplatin/5-FU group was 17 m (95%CI 11-81) with three-year OS of 38%. Cisplatin/ 5-FU group had a significantly better distant metastasis free survival (median 20 versus 11 m, p = 0.04) when compared to carboplatin/paclitaxel group. On multivariate analysis, cisplatin/5-FU (hazard ratio(HR) 0.45, p = 0.023) and carboplatin/5-FU group (HR 0.46, p = 0.093) were found to be associated with OS adjusted for other patient, disease and treatment related characteristics.

Conclusions: We report that patients receiving cisplatin/5-FU had a significant survival benefit compared to patients who received carboplatin/paclitaxel as a definitive treatment for esophageal and GEJ cancer. Carboplatin/ 5FU might be a reasonable alternate for highly select patients. Clinical trials regarding optimal chemotherapy regimen are warranted for patients who are not surgical candidates.

83 Late toxicity after TBI in AHCT for relapsed follicular lymphoma

1University of Ottawa, Ottawa, ON
2Ottawa Hospital Research Institute, Ottawa, ON

Purpose: Follicular lymphoma (FL) is a progressive relapsing hematologic malignancy. At The Ottawa Hospital (TOH), autologous hematopoietic cell transplantation (AHCT) utilizing total body irradiation (TBI) has been used to treat relapsed FL patients for over 20 years. We reviewed our large single institution experience and assessed outcomes and late toxicity.

Methods and Materials: We retrospectively reviewed consecutive patients undergoing AHCT for relapsed FL from July 1991 to February 2013. The pre-AHCT conditioning regimen was commonly Etoposide/Melphalan/TBI. Patients received TBI on a linear accelerator using a translating-bed technique. The total dose was 5 Gy/1fr for 92% of patients, the remainder received 12Gy/6fr. Lung attenuators were used to maintain dose homogeneity. Patient information was stored on our bone marrow transplant (BMT) database. Descriptive statistics were calculated for all relevant demographic variables. Overall survival was estimated from the BMT date using the Kaplan-Meier method. Second malignancies were reported. Late toxicity was assessed in patients with at least one year of follow up (FU). We evaluated 174 patients with a median age of 50 years at transplant. There were 106 men and 68 women. Median follow up was 6.0 years. Overall survival at one, five, 10 and 15 years was 93%, 73%, 57% and 47% respectively. Eighteen patients (10.3 %) developed a second malignancy; 11 (6.3%) had solid tumours, two (1.1%) had AML and five (2.9%) developed myelodysplastic syndrome. Median time to second malignancy was 7.2 years, with cumulative incidences of developing second cancer at 5% and 8% at five and 10 years. We evaluated 149 patients with at least one year of FU. Of 80 assessable patients, 23% developed hypothyroidism; 3% were hypothyroid beforehand. Pre-AHCT, creatinine ranged from 41 to 139 umol/L. Post AHCT, at least FU of 116 patients, creatinine (umol/L) was < 100 in 63%, 100-150 in 20%, 151-200 in 6% and > 200 in 9%. Hemodialysis was required for two patients. Clinical lung toxicity was noted in 6% of 95 patients. PFTs were recorded in 26 patients post-AHCT and 46 patients post-AHCT. Abnormalities in DLCO were noted in 17% pre-AHCT and 26% of post-AHCT. Abnormalities in FEV1 were noted in 11% pre-AHCT and 25% of post-AHCT. Radiologic abnormalities were noted in 39%, with 23% being fibrotic changes, possibly radiation-induced, and 17% likely unrelated.

Conclusions: Our results with TBI-based AHCT for relapsed FL are very good, with most patients surviving 10 years post-AHCT.
Severe late toxicity involving the lungs, kidneys and thyroid was relatively low. The risk of second cancers was acceptable. Our study indicates that this approach is both safe and effective.

B4
A 3D OPTICAL SCANNER FOR IMAGE ACQUISITION IN 3D PRINTING- OPTIMIZING IMAGE ACCURACY THROUGH THE DEVELOPMENT OF AN IN-HOUSE DESIGNED GANTRY
Kate Johnson1, Arbind Dubey1, Chad Harris2, David Sasaki1, Andy Egdert1, Daniel Rickey1, Rashmi Koul2
1University of Manitoba, Winnipeg, MB
2CancerCare Manitoba, Winnipeg, MB

Purpose: The use of 3D printing for medical use is well established and has been utilized in clinical practices ranging from surgical planning to individualized medical implants. Three-dimensional printing has been implemented at our institution to create customized treatment accessories such as shielding and immobilization. In order to use 3D printing, the topography of the patient must first be acquired. We have previously achieved this using resource intensive methods such as a plaster mould or a CT scan. Recently, 3D scanners have been developed which are low cost (~$500), and can quickly acquire both the topographical and texture information of a patient. These scanners use methods such as structured light in order to construct accurate 3D models in minutes. We have characterized a structured light 3D scanner (3D Systems Sense), and have designed and built a scanning gantry in order to assess the clinical viability of this technology.

Methods and Materials: The gantry consists of a circular hoop formed from square aluminum tubing, with a diameter of 126.5 cm. The optical scanner is mounted to an arm that can be moved isocentrically along the circumference of the hoop. The scanner-to-surface distance is adjustable to accommodate differently sized regions of the body. The gantry can tilt with respect to the patient table, allowing for acquisition of topography from virtually any direction. The gantry was built in-house with a total cost of about $500.

An anthropomorphic head phantom was used to quantify the accuracy of the gantry-mounted 3D scanner. Meshes acquired using the 3D scanner were compared to a mesh generated from a high resolution CT scan, which was taken to be the gold standard. Optimal scan settings were identified and final assessment of the accuracy of the scanner was quantified using the mean Hausdorff distance between the two meshes.

Results: The in-house gantry enabled quick and easy acquisition of patient topographical information with a low cost 3D scanner. Acquisition was much easier than using the scanner free-hand. The mean Hausdorff distance was typically found to be less than 0.5 mm, with maximum errors in the range of 1-2 mm. This was deemed to be clinically acceptable and the scanner has been used to design treatment accessories for several skin cancer patients.

Conclusions: Through a collaborative and innovative approach, an optical scanner gantry has been developed which can quickly, easily and accurately acquire topographical information. This information can then be used to design customized treatment accessories for many different treatment sites and modalities, including bolus and immobilization for both photon and electron treatments and shielding for orthovoltage treatments. The gantry is very lightweight and easy to store.

B8
USING OPTICAL SCANNER AND 3D PRINTER TECHNOLOGY TO CREATE LEAD SHIELDING FOR RADIOTHERAPY OF FACIAL SKIN CANCER WITH LOW ENERGY PHOTONS: AN EXCITING INNOVATION
Ankur Sharma, Arbind Dubey, Ahmet Leylek, Daniel Rickey, David Sasaki, Chad Harris, Jim Butler, Boyd McCurdy
University of Manitoba, Winnipeg, MB

Purpose: Treatment of non-melanoma skin cancers of the face using orthovoltage radiotherapy may require lead shielding to protect vulnerable organs at risk (OAR). As the human face has many complex and intricate contours, creating a lead shield can be difficult. The process can include creating a plaster mould of a patient’s face to create the shield. It can be difficult or impossible for a patient who is claustrophobic or medically unable to lie flat to have a shield made by this technique. Other methods have their own shortcomings. We aimed to address some of these issues using an optical scanner and 3D printer technology.

Methods and Materials: The clinicians identified three patients with skin cancer involving the nose who required treatment with low energy photons and would benefit from lead shielding. Marking was made on these patients to define the field. Optical images of these patients were acquired using a consumer-grade optical scanner (3D Systems, Sense). A 3D model of each patient was processed with mesh editing software (Autodesk, MeshMixer v2.9) before being exported as an STL file to software controlling the printer (Repetier-Host). A positive model of each face was printed using polylactic acid on a consumer-Grade 3D printer.