

**Abstract - ID: 12**

**Author(s):** Alexander Osman (**Presenter**), American University of Beirut Medical Center

**Are you an invited speaker/presenter to ICRM2018?:** No

**Title:** Artificial Intelligence in Radiation Oncology: Automated Brain Tumor Segmentation and Patient Overall Survival Prediction

**Abstract:**

**Purpose:** The process of glioma tumor delineation is usually done manually and it involves a considerable amount of time and effort, particularly for adaptive radiation therapy. This study presents algorithms for glioma tumor segmentation and patient's overall survival prediction using state-of-the-arts machine learning techniques.

**Methods:** Multi-institution BRATS'2017 datasets of MRI scans for 477 patients with high and low-grade glioma brain tumors, with 291 available survival clinical data were used in this study. We developed two sophisticated tools via support vector machines. The first algorithm is fully automated to delineate the whole tumor on a T2-Flair MRI scan. The second algorithm predicts patient's overall survival from the segmented tumor and patient's clinical data. The algorithms were validated and tested by the BRATS's evaluation system for benchmarking.

**Results:** Average Dice score (the similarity between the automatically and manually segmented tumors) for the whole tumor segmentation obtained on the validation and testing datasets is  $0.53 \pm 0.31$  (median is 0.60, and the 75th percentile is 0.81). Accuracies obtained for the overall survival evaluation, based on regression principle, are 0.49 and 0.35 for the validation and testing datasets, respectively. Moreover, overall accuracy achieved for a designed validation dataset is 1.00 in class prediction in short ( 18 months) survivors.

**Conclusion:** In its present form, the segmentation tool is fully automated, fast and provides a reasonable accuracy on multi-institutional data. The survival algorithm showed perfect accuracy in class prediction and reasonable accuracy in regressive prediction. Further improving the algorithms would provide quite accurate and cost-effective supplement tools.

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**Please provide details:** The work was presented at Multimodal Brain Tumor Image Segmentation Challenge held in conjunction with the Medical Image Computing and ComputerAssisted Interventions Conference 2017 (MICCAI-BRATS 2017), at Quebec, Canada (Sept. 14, 2017). \*Written permission obtained from the BRATS'2017 Challenge Organizers to use the data and our results in the challenge outside the BRATS'2017 competition.

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**Abstract - ID: 68**

**Author(s):** Mohammed Ouar (**Presenter**), University of Science and Technology of Oran Mohamed Boudiaf  
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Mohamed Noureddine BELKAID, University of Science and Technology of Oran Mohamed BOUDIAF.

**Are you an invited speaker/presenter to ICRM2018?:** No

**Title:** Monte Carlo simulation of the effects of bio-nanoparticl in proton therapy using Geant4

**Abstract:**

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Proton therapy is an optimal application of tumors in oncology, it allows optimal treatment of tumors in sensitive areas, by limiting the maximum absorbed dose of targeted tumors and sparing healthy tissue at a distance. Our work consists of using the Monte Carlo method implemented in the Geant4 code (Geometry and tracking) to simulate the effects of nanoparticles in proton therapy in the treatment of brain tumors. We will add bio-nanoparticles and modify their distribution and concentration in the tumor, in order to study their effects, then to try the optimization of treatments by proton therapy using bio-nanoparticles .

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**Category:** Radiation Oncology

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**Author(s):** abdullah alsuhaibani (**Presenter**), KFSHRC  
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**Are you an invited speaker/presenter to ICRM2018?:** Yes

**Title:** Stereotactic body radiation therapy (SBRT) using Cyber Knife in recurrent pancreatic cancer patients ;retrospective evaluation ,single institution experience

**Abstract:**

### **Abstract**

**Background:** we retrospectively evaluate local control rate at 6 months and 1 year in recurrent pancreatic cancer patients treated with SBRT using Cyber Knife.

**Methods:** total of 5 recurrent pancreatic cancer patients from September 2014 till April 2017 treated with SBRT using Cyber Knife in our institution were included in this study..

**Results:** All patients had up front whipple surgery with adjuvant chemotherapy, all patient had a recurrent disease in the surgical bed with median size of 2.2 cm and median SUV max of 4.6 .The median DFS post-surgery was 29 months range 8-62 months. All patients received SBRT with dose range 35-50 GY / 4-5 fractions with average PTV volume of 97.3 cc .NO reported G3 or G4 acute toxicity with nausea G2 occurred in 3 patients. The 6 months local control rate was 100 % with 3 patients ( 60%) achieved complete response with no residual FDG activity in PET-CT, while other 2(40%) achieved PR . The 1 year local control rate was 100 % with 3/3 patients maintaining CR , the median follow up was 19. Months range 6-39 months .No patients progressed locally, with 3 patients progressed systemically (60%) with median PFS was 18.2 months range 6-36 months ,

**Conclusion:** SBRT using Cyber Knife in recurrent pancreatic cancer patients is feasible, safe and effective treatment , with 100% local control rate at 6 months and 1 year in our patient cohort, a larger cohort of patient and longer follow up is required for better evaluation

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## **Abstract - ID: 435**

**Author(s):** Baderaldeen Altazi (**Presenter**), King Fahad Specialist Hospital Dammam/  
Moffitt Cancer Center

**Are you an invited speaker/presenter to ICRM2018?:** No

**Title:** PET/CT Radiomics and Habitats as Predictors of Radiochemotherapy Treatment Outcomes of Cervical Cancer

### **Abstract:**

This study investigates the feasibility to utilize radiomic and habitat features obtained from combined F18-Fluoro-deoxy-glucose (18F-FDG) PET/CT images of 124 cervical patients treated by radiochemotherapy to predict for the development of distance metastasis (DM). We extracted 160 radiomic features describing the texture, shape, and Intensity-Volume Histogram (IVH) of the Standardized-Uptake Values (SUV) and Hounsfield Units (HU) distribution within patients' segmented tumor volumes. We created a mathematical model which focuses on spatially distinct

tumor subregions (habitats) that are identified based on voxel intensity thresholds of the pretreatment PET/CT imaging data of each patient tumor volume. We tested the association between radiomic and habitat features with outcomes using multiple logistic regression (MLR) and support vector machines (SVM) modeling. We determined the best models within the training set using 10-fold cross-validation as part of backward selection based on Akaike Information Criterion (AIC) to build the MLR model and using Relief-F with Ranker search to generate SVM classifier using top five to twenty features. After testing on an independent set, the final MLR model to predict for DM resulted in a smaller area under the receiver operator characteristic curve (AUC) than the final SVM classifier with an AUC score of 0.71, and 0.80, respectively. For habitats, a combined high-intensity PET/CT habitat features showed a significant difference in survival times between the two studied groups and were the highest predictors for DM (AUC = 0.75). In conclusion, multimodality PET/CT signature models provide better performance in contrast to individual features extracted from each imaging modality separately. Also, PET/CT-radiologically defined habitats may provide valuable predictive descriptors of cervical cancer tumors.

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**Abstract - ID: 436**

**Author(s):** abdullah alsuhaibani, KFSHRC  
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ahmed elashwah (**Presenter**), KFSHRC

**Are you an invited speaker/presenter to ICRM2018?:** Yes

**Title:** Stereotactic body radiation therapy (SBRT) using Cyber Knife in cancer patients with oligo-metastasis ;retrospective evaluation ,single institution experience

**Abstract:**

**Abstract**

**Background:** we retrospectively evaluate local control rate at 6 months and 1 year in oligo-metastatic cancer patients treated with SBRT using Cyber Knife.

**Methods:** total of 21 patients with 24 treatment sites from February 2014 till June 2017 who were treated with SBRT in our institution were included in this study.

**Results:** Colorectal cancer is the most commonly diagnosed cancer in 18 patients (85.7%).The abdomino-pelvic lymph nodes were the commonest treatment site in 12 sites (50%), with average PTV volume of 48.5 cc. All the patients received SBRT with dose range from (30-60GY/3-5 fractions). No reported G3 or G4 acute or chronic toxicity. The 6 months local control rate was 95.8 % (23/24 sites) 13 of them( 56.5%) had shown complete metabolic response with no residual FDG activity in PET-CT, The 1 year local control rate was 87.5 % (14/16) 10 of them (71.4%) had shown complete metabolic response, the median follow up was 19.8 months( range 6-41 months ), local progression occurring in 3 treatment sites (12.5 %) with median time to local progression was 10 months ( range 6-12 months), while systemic progression occurred in 6 patients (28.5%) with median PFS 8 months (range 6-12 months).

**Conclusion:** SBRT using Cyber Knife is feasible, safe and effective treatment in treating oligo-metastatic sites , with 6 months and 1 year local control rate is 95.8 % and 87.5 % respectively in our patients cohort , a larger cohort of patients and longer follow up is required for better evaluation.

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## **Abstract - ID: 508**

**Author(s):** Noha Jastaniyah (**Presenter**), KFSHRC  
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**Are you an invited speaker/presenter to ICRM2018?:** No

**Title:** Breast cancer patients outcomes post up front mastectomy with and without adjuvant radiation therapy; retrospective evaluation ,single institution experience

**Abstract:**

**Abstract**

**Purpose:** To evaluate Breast cancer patients outcomes following up front mastectomy with and without adjuvant radiation therapy.

**Methods:** 466 Female patients with breast cancer who underwent upfront mastectomy between January 2009 to December 2013 in our institution KFSHRC were retrospectively reviewed to compare patients who received adjuvant radiation ( **group A**) for those who did not receive (**group B**).

**Results:** Patients in **group A** had more advanced disease stage and more aggressive tumor biology in comparison to those in **group B** ( T3/T4 in 35% and 13% , N+ in 87% and 53%, HER-2neu +3 in 34% and 18% and ER negative in 32% and 21% in **group A** and **group B** respectively) .Adjuvant radiotherapy was delivered in 50% (233 patients). After a median follow-up of 21 months (range 2-133), 444 (95.3) of patients were alive, However, 43 patients (9.2%) developed recurrences: 14(3%) developed loco-regional while 35 (7.5%) developed systemic recurrences. The 2-year loco regional control , distant control and OAS rate were 98%,88% and 95% respectively in **group A** and 96%,96% and 96% respectively, in **group B**.

**Conclusion:** loco regional control was acceptable in patients received adjuvant radiation therapy in spite of their advanced stage and more aggressive tumor biology.

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## **Abstract - ID: 514**

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Yasser Khafaga, KFSH & RC

**Are you an invited speaker/presenter to ICRM2018?:** No

**Title:** CYBERKNIFE BOOST IN PAEDIATRIC POSTERIOR FOSSA EPENDYMOMA

### **Abstract:**

**Background** Limited data are available regarding the use and benefit of cyberknife in pediatric ependymoma. We are presenting our Cyberknife experience in treating pediatric posterior fossa ependymoma.

### **Methods**

Thirteen posterior fossa ependymoma (age less than 16 years) were treated using cyberknife between 2010 and 2015 were retrospectively reviewed

## Results

Patients had subtotal resection received cyberknife treatment boost following Rapidarc conventional fractionation to a total dose of 59.4 Gy (1.8 Gy per fraction). Spinal cord was excluded from target volume after 54 Gy. Boost cyberknife dose ranged from 5.4 to 9 Gy in 3-5 fractions. The average gross tumor volume was 8.7 cc. An average of 144 beams was used. Dose was prescribed to 70- 81% isodose line with an average CTV coverage of 93%. All patients tolerated treatment well with no Grade III toxicity reported. After a median follow up of 36 months, the 3 years local control was 62% while the 3 years overall survival was 54%

## Conclusion

Using cyberknife, we were able to escalate the dose to residual/recurrent posterior fossa ependymoma without exceeding the brain stem/spinal cord constraints. Treatment was well tolerated. Rapidarc and cyberknife composite plans can potentially reduce the long-term toxicities associated with radiation therapy by reducing the amount of irradiated normal brain parenchyma and by limiting.

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**Abstract - ID: 519**

**Author(s):** abdullah alsuhaibani (**Presenter**), KFSHRC  
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Ahmed alzahrani, KFSHRC  
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Shada Wadi Alramahi, KFSHRC

**Are you an invited speaker/presenter to ICRM2018?:** No

**Title:** The use of Intraoperative electron-beam radiation therapy (IOERT) in multimodality approach. A single institution experience.

**Abstract:**

**PURPOSE:** Assess the feasibility of intraoperative radiotherapy (IOERT) and short-term toxicities of patients treated in a multidisciplinary protocol including IOERT.

**METHODS:** We retrospectively evaluated patients who received IOERT as part of their multidisciplinary Treatment at our institution KFSH&RC From August 2013 until Dec 2017 were analyzed.

**RESULTS:** A total of 184 patients with total of 205 IOERT applications were analyzed. 23 patients had more than one application. 116 patients were males and 68 were females. Median age at diagnosis was 47 years (range 19-78). The prescribed dose range from 5-20 Gy using 6, 9 and 12 MeV. 67 patients (36.4%) had Upper GI cancers, 49 patients (26.6%) had retroperitoneal sarcoma, 34 patients (18.4%) had colorectal cancers, 16 had Gynaecological malignancies, 7 patients had Genitourinary cancers and 11 patients had other cancers. R0 resection achieved in 130 patients (70.6%), 51 patients (27.7%) had R1 resection and 3 patients (1.7%) had R2 resections. Most of the patients underwent major surgeries and 118 patients (79.7%) had hyperthermic intraperitoneal chemotherapy (HIPEC) in addition to IOERT. The median follow-up time was 12 months, the reported post operative short-term toxicities were as follow: 18 patients (12.1%) developed leakage, 12 (6.5%) developed sepsis, 4 (2.7%) developed bleeding, two develop DVT (1.08%) and one had Pulmonary Embolism (0.54%), and No reported perforations, fistula or nerve injuries.

**CONCLUSION:** IOERT in a combined multimodality treatment in selected patients was well tolerated by the patients and associated with acceptable short-term morbidity. A longer follow-up is needed for evaluation of any potential late side effects.

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