AbstractID: 14041 Title: Comparison of dose based and biological based treatment planning systems for the Siemens Artiste Linear Accelerator.

Purpose: To compare the performance of the biological-based treatment planning system (TPS) CMS Monaco with the dose-based TPS CMS XiO, for treatment of head and neck patients on the Siemens Artiste Linear Accelerator. **Method and Materials:** Three head and neck patients treated on the Artiste and planned with XiO were replanned using Monaco. The Monaco plans were developed using the same clinical objectives concerning the prescription dose to the target and the maximum allowed dose to the organs at risk. The XiO plans were optimized using the Superposition algorithm employing dose-volume and minimum/maximum dose constraints. The Monaco plans were optimized with the Monte Carlo algorithm using biological cost functions. Minimum, maximum and mean doses were compared as well as the equivalent uniform dose (EUD), total number of segments and monitor units (MU) required. The plans were delivered onto the Sun Nuclear MapCheck diode array with a 3%/3mm distance to agreement criterion. **Results:** Target coverage was similar in both plans. The average reduction in the Monaco mean dose was 4.7, 1.7, 9.3 and 11.2 Gy for the spinal cord, brainstem and, right and left parotid, respectively, compared to the XiO plans. The number of segments was comparable for two patients and was reduced by 63 for the third patient. The number of MU's for the Monaco plans were greater in all three cases. **Conclusion:** The three plans developed with Monaco were deemed to be clinically acceptable and were dosimetrically equivalent or superior to plans developed using XiO. The Monaco plans had superior organ at risk sparing whilst maintaining the same target coverage achieved with the XiO system.