# AbstractID: 1620 Title: A unified optimization platform comparison of three radiosurgery techniques: Gamma Knife, BrainLAB static gantry micro-MLC, and Nomos serial tomotherapy MIMiC.

With the advent of the Gamma Knife in 1968 and the subsequent evolution of cone-based delivery techniques, radiosurgery emerged as a valuable tool in the treatment of intracranial lesions. Both Gamma Knife and linac coned-based radiosurgery methods represent approaches which may be referred to as being sphere-based, in that both methods of delivery utilize roughly spherically shaped high dose regions as the fundamental building block of dose. Within the last decade, Intensity Modulated RadioSurgical (IMRS) approaches have evolved, taking advantage of the ability to modulate the intensity of pencil beams of radiation through either binary or sliding leaf multileaf collimators (MLC's). The availability of multiple modalities for radiosurgery delivery raises the following question, What are the strengths and weaknesses of each? In this study we develop a unified, single software platform for the comparison of optimized treatment plans for Gamma Knife, BrainLab micro-MLC and Nomos Mimic. By optimizing all treatment plans under a common optimization platform we eliminate such confounding variables as: human bias, optimization method, dose matrix resolution, dose calculation algorithm, target definition, etc. Minor variations in any of these variables are capable of inverting conclusions in our experience. The unified software platform utilizes fast simulated annealing (FSA) and a novel conformity-based objective function. We investigate the performance of each modality on five clinical radiosurgical lesions treated previously in our clinic. The lesions include a large and small arteriovenous malformation (AVM), an acoustic neuroma, a metastatic lesion and trigeminal neuralgia.