MATHEMATICAL MOMENTS

Eva K. Lee, *Georgia Institute of Technology*

Targeting Tumors

AMS Podcast Series

Detection and treatment of cancer have progressed, but neither is as precise as doctors would like. For example, tumors can change shape or location between pre-operative diagnosis and treatment so that radiation is aimed at a target which may have moved. Geometry, partial differential equations, and integer linear programming are three areas of mathematics used to process data in real-time, which allows doctors to inflict maximum damage to the tumor, with minimum damage to healthy tissue.

One promising area of investigation is *virotherapy*: using viruses to destroy cancerous cells. Researchers are using mathematical models to discover how to use the viruses most beneficially. The models provide numerical outcomes for each of the many possibilities, thereby eliminating unsuccessful approaches and identifying candidates for further experimentation. Testing by simulation, which led to the development of anti-HIV cocktails, means good medicine is developed faster and cheaper than it can be by lab experiments and clinical trials alone.

For More Information: "Treatment Planning for Brachytherapy," Eva Lee, et al, *Physics in Medicine and Biology*, 1999.

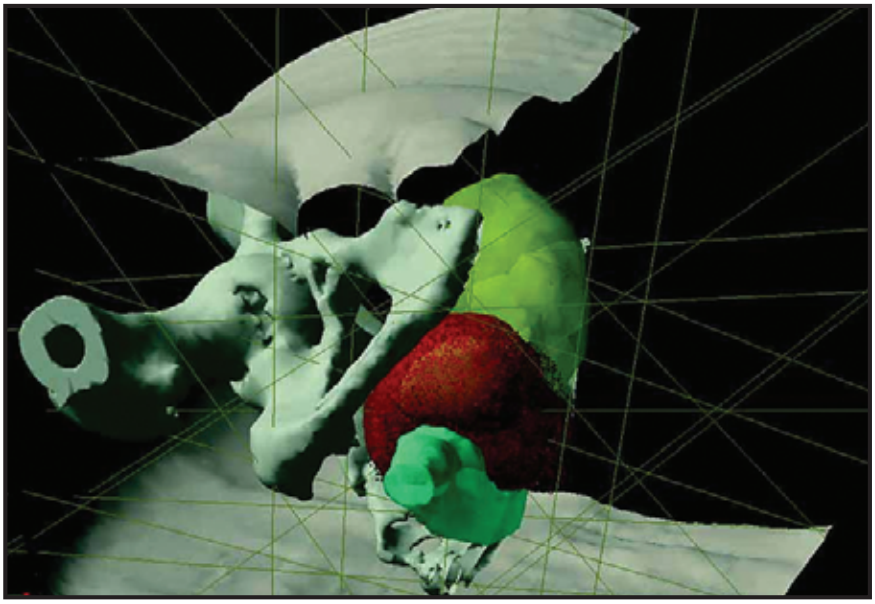

Image: Large-scale intensity-modulated radiation therapy optimization (tumor in red), courtesy of Eva Lee, Georgia Institute of Technology.

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