Cancer treatment

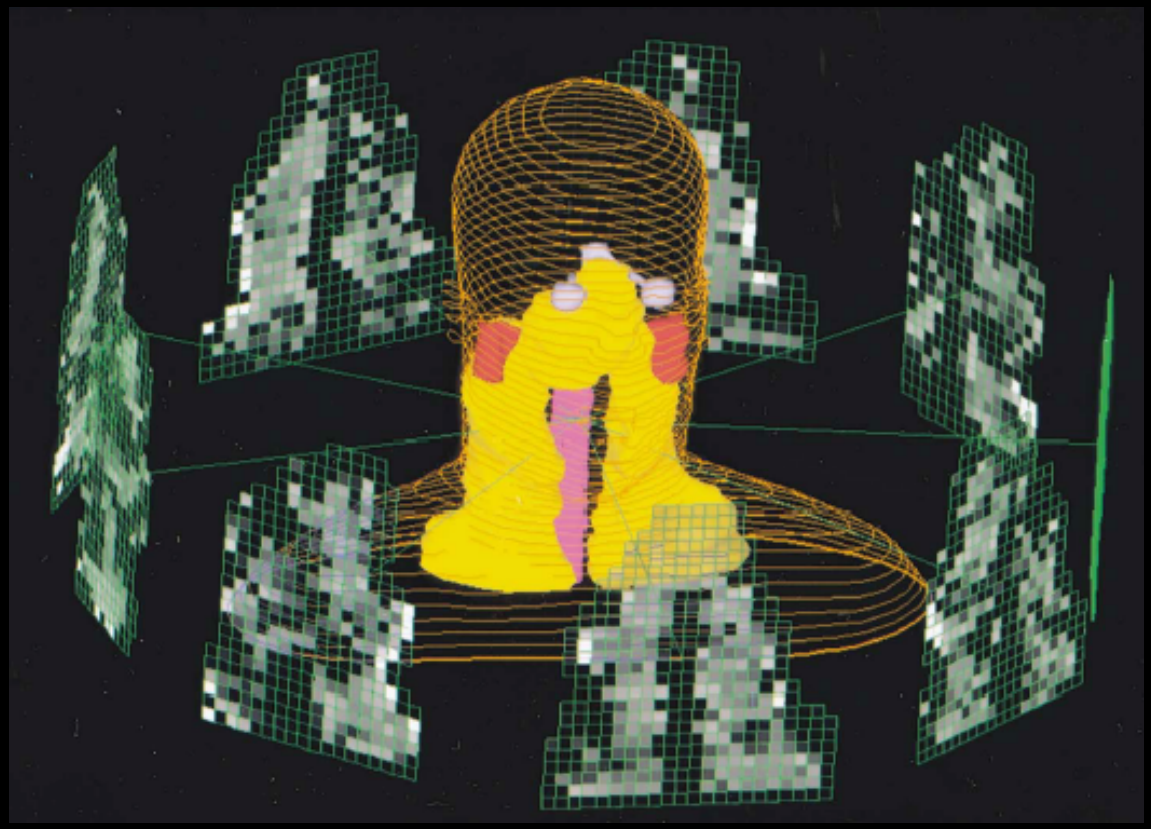
- About 1.3 million new cancer cases in the U.S. each year
- Over 50% receive radiation therapy (in conjunction with surgery, chemotherapy etc)

External beam radiation therapy

- Radiation delivered by a linear accelerator
- Cancer cells more susceptible than normal cells
- Overlay beams from different angles
- Dose given in daily fractions for ~ 6 weeks

Intensity Modulated Radiation Therapy

- Block parts of the radiation beam – discretize the whole beam into a grid of smaller "beamlets"
- Choose different intensities for each beamlet

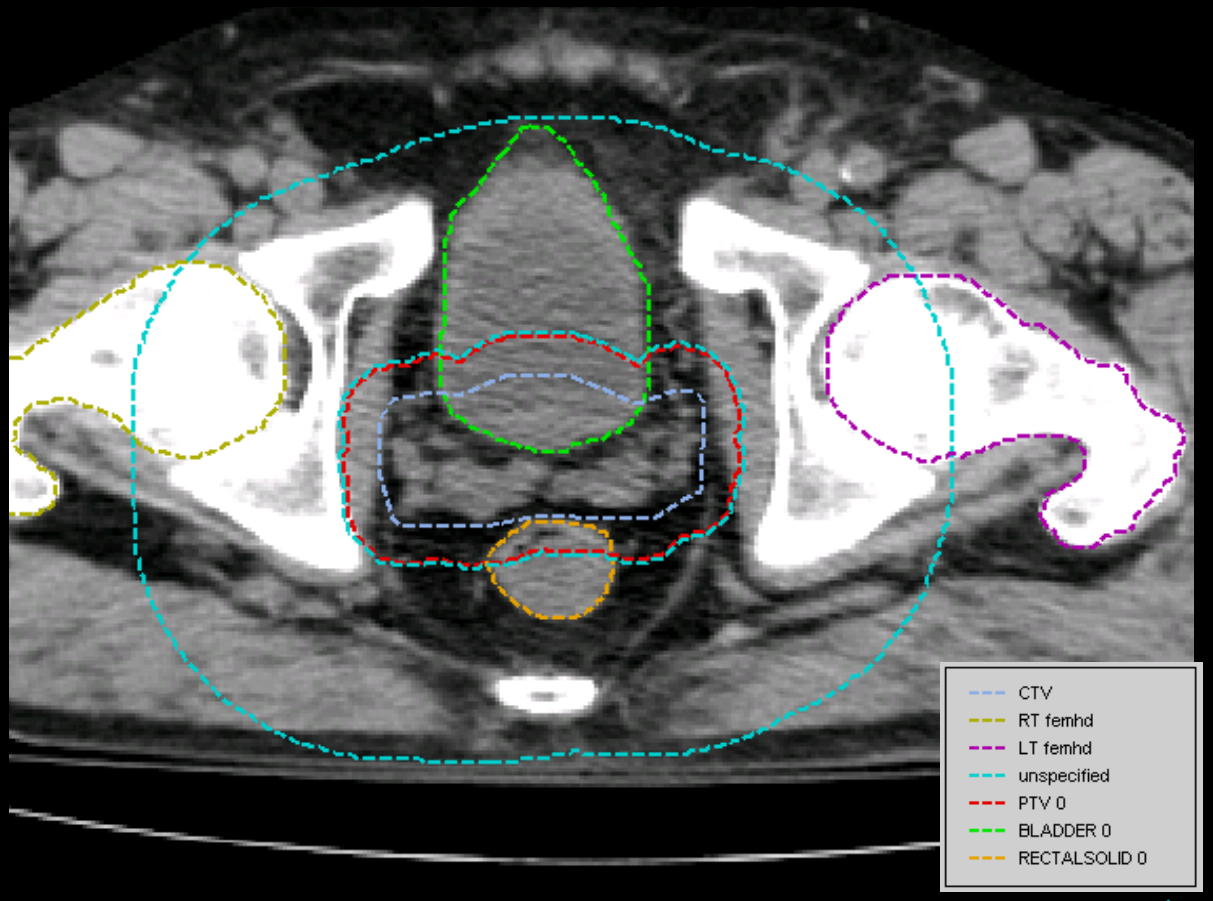


Intensity Modulated Radiation Therapy Collaborative Working Group, 2001

Treatment Planning

Goal: Choose beamlet intensities that deliver enough radiation to kill all tumor cells, while avoiding healthy organs & tissue as much as possible

- Take CT scan
- Delineate target region and healthy structures
- Discretize body as small cubes, or "voxels"
- Formulate & solve a mathematical program to find a "good" plan



Princess Margaret Hospital