PROTON THERAPY AT LOMA LINDA UNIVERSITY

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PTCOG Beginning

- Develop technical and clinical needs for proton therapy
- Many ideas and opinions
- Need for facilities to exist for 50+ years
- Changes are inevitable over time
 - Technology changes
 - Clinical application changes
- Would it be possible to maintain and upgrade a facility over time as needs and technology change?



Overview

- Opened to first patient treatment in 1990
- 13,000 patients planned and treated
- 325,000 treatments delivered
- 240 different clinical sites
 More than 60 sites with 10 or more cases

210 different histologic subtypes



Recent Developments

Technology

Facilities / Operational Software

Research



Technology Developments

■ Synchrotron 70 – 250 MeV

- 100% of accelerator and beam line electronics and software is new
- Extracted beam from accelerator is 'smooth' enough for spot scanning
- Accelerator beams can be extracted at 0.1 MeV intervals and energy changed every 2 seconds
- Prototype scanning system has been running and clinical version presently in production
- Install in research room 12/08 for testing and commissioning
- Install in clinical room spring 09

 Treatment room upgrades have been designed and in construction



Facility Expansion

"What are you going to do with all this space?" HS 1989



Clinical Software

- New treatment planning software has been implemented (3rd major upgrade)
 - FDA, PC, Windows, Citrix

Integration between software systems:

- Planning system (Odyssey)
- Scheduling (Aria)
- □ Linac record and verify
- Proton record and verify
- Electronic chart, billing, compliance, and database software (Oncochart)



Research

- Since inception have grown in many areas
- MDs: presently 10 physicians directly involved in proton therapy and research
- Clinical physics: grown from 2 PhDs and 4 dosimetrists to 6 PhD's and 4 MS, 4 BS, and 10 dosimetrists
- Biology program: increased from 2 PIs to presently 10 PIs
 - Core Laboratories construction completed

Research

Section of Translational Research



Clinical Developments

- Clinical trials
 - Phase I thru phase III
- Toxicity Reduction
 - Pediatrics
 - Acoustic neuromas
 - Macular degeneration
 - CNS
- Dose escalation, standard fractionation
 - Prostate



Altered Fractionation

Radiosurgery - AVM Fractionated stereotactic proton therapy Brain mets, Large AVMs • Accelerated fractionation Concomitant boost Oropharynx cancer Locally advanced lung cancer



Altered Fractionation

HypofractionationEarly lung cancer

Hepatocellular cancer

Early breast cancer

Prostate cancer



Investigate proton interactions at the cellular level (RS, JMS)

- Nanodosimetry
- Proton CT
- Incorporate biologic effects with physical dose distribution into the treatment planning process





