Introduction

• What is isotoxic radiotherapy?
• Why Non-Small Cell Lung Cancer (NSCLC)?
• Planning study and methodology
• Early Results
• Conclusion

Radiotherapy prescription dose

• All patients receive the same prescription
• Safe and effective over a population
• Current practice - 66Gy in 33 fractions
• Individual disease and anatomy may not suit!

Why isotoxic RT in NSCLC?

• Local control is a problem
• Survival is linked to local control
• Radiation dose improves both (Kong 2005)
• Size of lungs/proximity of spinal cord varies from patient to patient

Isotoxic RT in NSCLC

• Max dose 79 Gy (1.8 Gy bd) (BED~100Gy)
• Favourable results
• Did not use IMRT
**Design of planning study**
- Will IMRT allow more patients to reach 79 Gy?
- What patient characteristics determine the level of escalation?

**Methodology**
- Retrospective planning study
- 20 patients
- Stage II and III
- 3 methods: IMRT, 3DCRT and IP
- Dose escalated until OAR tolerance dose reached

**Early results**
- Max dose reached = 70.2 Gy (Equivalent 80Gy 2Gy/fraction Mon-Fri)
- 15/20 IMRT vs 5/20 3DCRT/IP
- Mean dose higher for IMRT

**Organ at risk sparing: spinal cord**
- IMRT allows sparing of some normal tissues
- Spinal cord spared high dose
- Key
  - yellow= 67 Gy
  - orange= 54 Gy
  - Light blue= PTV
Organ at risk sparing: brachial plexus

- Higher doses reached with IMRT
- Small volume of overlap essential
- All of the PTV treated to 59 Gy
- Most of PTV reaching 67 Gy

Key
- yellow = 67 Gy
- orange = 59 Gy
- light blue = PTV
- red = brachial plexus

Organ at risk sparing: Great vessels and main bronchus

- Maximum dose of 74 Gy
- Stage II and III disease large and/or central
- Overlap region between OAR and PTV too great

Future work

- Further escalation through margin reduction
- Could we escalate dose to just part of the PTV?
- PET fusion could allow a refined 2 dose-level IMRT solution.

Conclusion

- Distinct advantage with IMRT
- Further analysis of patient characteristics
- Clinical pilot study
- Future PET fusion/dose escalation trial with the European ARTFORCE Consortium (Max dose ~130Gy)