

### Purpose:

To compare correlations between radiation and perfusion damage in lung cancer patients treated with 3D-CRT (both radical and palliative intent) and SBRT.

### Methods:

Eleven (3 palliative 3D-CRT, 5 radical 3D-CRT, 3 SBRT) non-small cell lung cancer patients receiving radiation therapy were included in this study.  $^{99m}\text{Tc}$  SPECT scans were performed before RT and 2~3 months after RT. Perfusion images were reconstructed with quantitative attenuation and scatter corrections. These reconstructions were used to assess the change in lung perfusion, i.e. blood flow, as an effect of radiation on the normal lung during RT. Dose and corresponding percentage reduction in the SPECT intensity were used to establish dose-response curve.

### Results:

- 1) No dose-response was observed in the palliative patient group possibly due to tumor regression and reperfusion. The threshold dose of compensation (increased perfusion in low dose region) could not be found, although increased perfusion in either low dose or high dose volume was common.
- 2) A consistent pattern of compensation and reduction of perfusion was observed in four patients. D50, dose causing 50% reduction in perfusion ranged from 39 to 54Gy. Reperfusion was observed in one of the five patients in the radical patient group.
- 3) In the SBRT patient group, a consistent pattern of decreased perfusion was observed in two patients. Compared to patients treated with radical 3D-CRT, the reduction in perfusion caused by high grade dose (>30Gy) is much smaller in SBRT patients (25% reduction at 45Gy compared to 35% in radical 3D-CRT group).

### Conclusions:

A strong correlation of radiation dose and perfusion change was found in patients treated with 3D-CRT with a radical intent, but not palliative intent. Interestingly, perfusion loss in SBRT is smaller than 3D-CRT, suggesting that normal lung in SBRT eligible patients is more capable of preserving lung function.