

Introduction

Radiomics is a quantitative medical image analysis approach used to improve diagnosis, prognosis, and radiotherapy (RT) treatment planning¹. Radiomic features may be sensitive to computed tomography (CT) image acquisition parameters². The potential inconsistency may impede robust analysis in multi-institutional collaborations.

Aim

To investigate radiomic feature consistency of planning CT images acquired using provincial BC Cancer scanners.

Methods

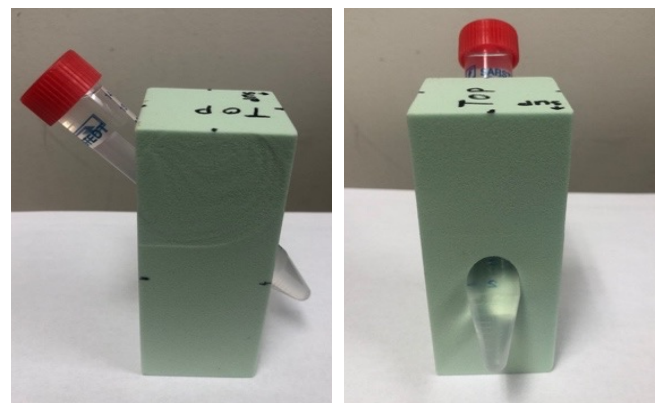


Figure 1: Foam phantom with a water insert.

- A 3-D phantom was made from lung-equivalent foam and a water insert (Figure 1).
- The phantom was imaged with clinical General Electric (GE) CT scanners at all 6 BC Cancer centres using lung RT planning protocols.
- 61 radiomic features were extracted from automatically delineated contours using Imaging Biomarker Explorer (IBEX) software³.
- Features across centres were compared using Kruskal-Wallis H tests.

Results: Image Acquisition Parameters Across the Province

Overall, centre-specific lung CT acquisition parameters are similar (Table 1). Differences in tube current and exposure time may be due to automatic exposure control settings.

Centre	GE Scanner Model	Tube Voltage (kV)	Tube Current (mA)	Exposure Time (s)	Generator Power (kW)	Convolution Kernel	Slice Thickness (mm)
FV	Optima CT580	120	100	1503	5280	Lung	2.5
VC	Discovery RT	120	150	856	18000	Standard	2.5
AC	LightSpeed RT16	120	40	4000	4800	Standard	1.25
VI	Optima CT580	120	10	800	52800	Standard	2.5
CI	Advantage 4D	120	10	800	52800	Standard	2.5
CN	Optima CT580	120	20	500	48000	Standard	2.5

Table 1: Routine lung CT acquisition parameters across BC Cancer centres.

Results: Radiomic Feature Variability

No significant difference in radiomic features between provincial scanners was observed (Bonferroni-corrected $p > 0.05$).

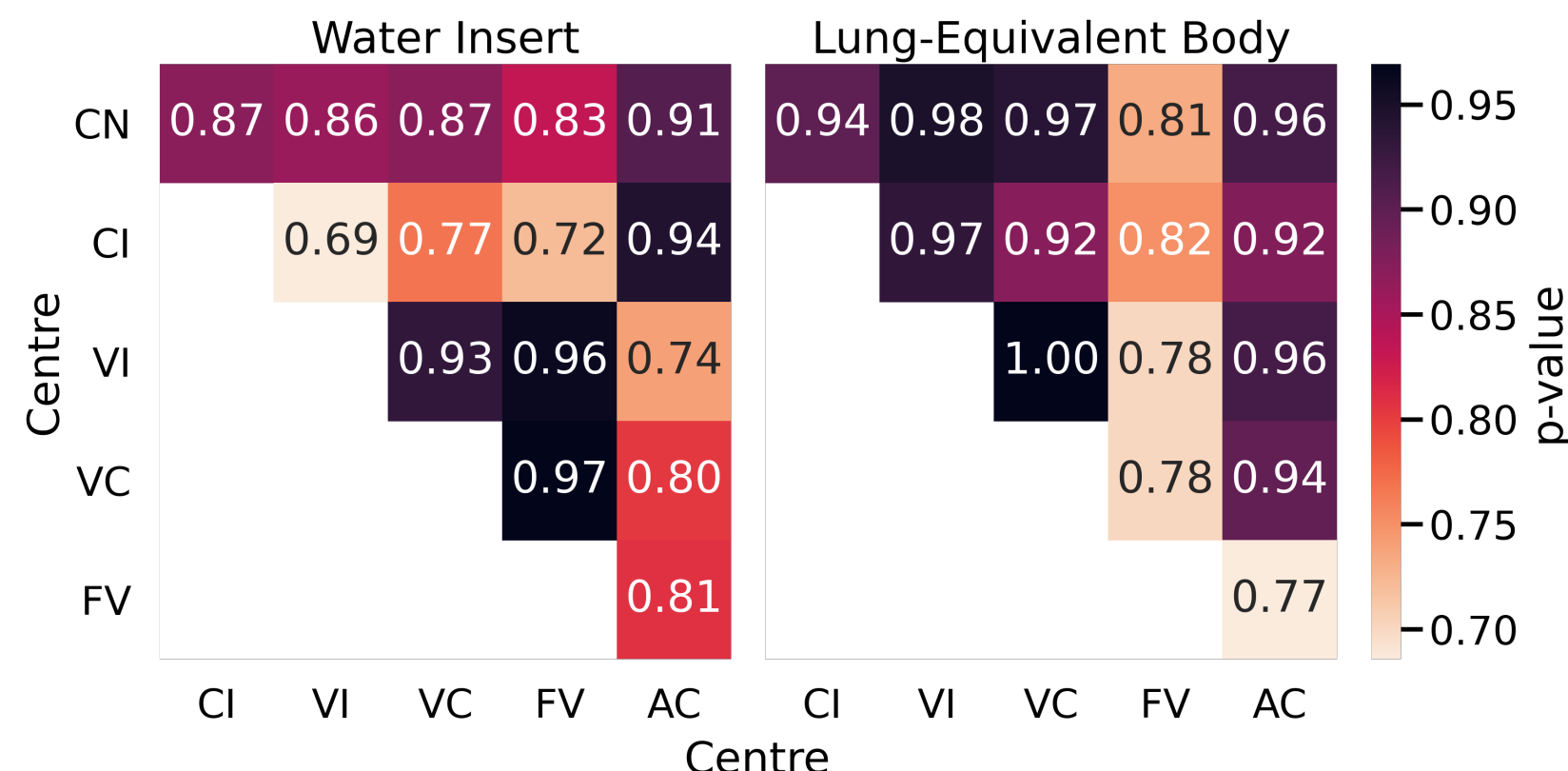


Figure 2: Heatmaps of p-values comparing radiomic features across centres.

Conclusions

- Thus far, results do not preclude using provincial imaging data as a single data set.
- Other materials (ex. contrast dye, sand) may be included in future study.

References

1. Gillies, RJ et al. *Radiol* 2016; 278(2):563-77.
2. Kim YJ et al. *Comput Math Methods Med* 2019; 2019(8790694).
3. Zhang, W et al. *Med Phys* 2015; 42(3):1341-53.

Acknowledgements

Colleagues in BC Cancer Abbotsford, Kelowna, Victoria, and Prince George.

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