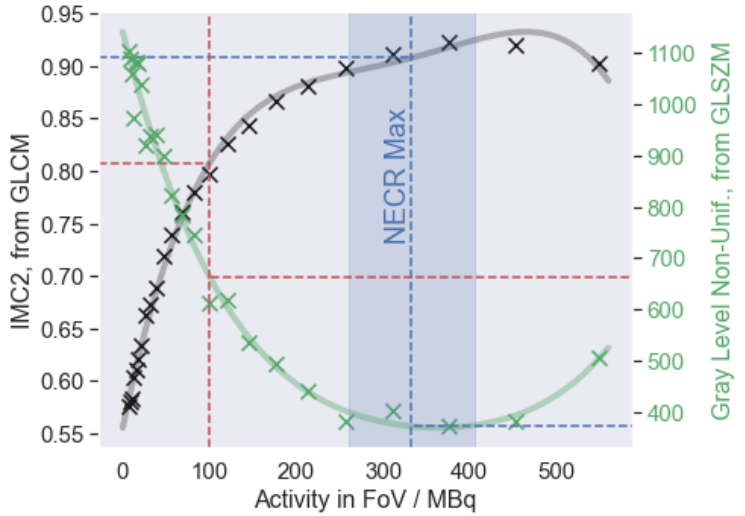
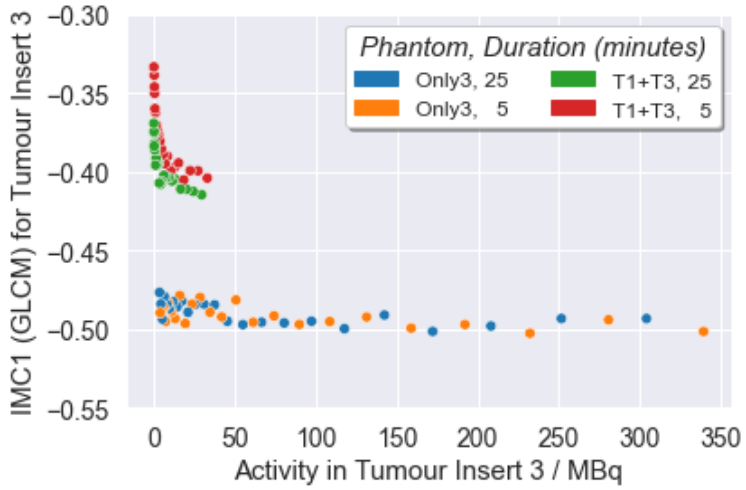
Assessing the robustness of radiomics feature measurements using the noise equivalent count rate, and the future role of Total Body PET

- The metrics describing image texture that are used in radiomics software present an exciting future, but PET's inherent noise results in great difficulty evaluating uncertainties for these features; this study sought to investigate their robustness using multiple high activity ^{18}F phantom scans decaying over 12 hours on a Siemens Biograph mCT
- Many radiomics texture features (32/75) correlate strongly with NECR ($|\mathrm{PMCC}| \geq 0.9$) for a large-volume, long duration acquisition (25 minute 20 cm cylinder phantom used)
- This enables calculation of `correction factors' for feature values from (noisy) clinical levels (approximated to 100 MBq) to an NECR (and hence 'SNR') peak
- Correlations reduce when utilising shorter acquisitions (for 10 highest-correlation metrics only 7 pass PMCC threshold, average $|\mathrm{PMCC}|$ drop of (11.5 ± 6.6) %)
- Correlations also drop for smaller 'subsets' of larger activity, e.g. ROIs of hot tumour phantom inserts on hot background
- Sensitivity advantage of Total Body PET can give a SNR boost approximate to the difference between the long- and short-duration scans used in this work – important for future clinical application
- Work is underway estimating `tumour-specific NECR' to better model regional noise





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