In radiography practice it is essential to understand the performance of the novice observer. Suitable training and experience are key to the success of student and newly qualified radiographers.

The Society and College of Radiographers (SCoR) would like to see all radiographers participating in ‘red-dot’ and/or commenting systems.\(^1\)

Hardy and Culpan have looked at the influence of training and experience on a radiographers ability to accurately ‘red-dot’ and comment on radiographic appearances.\(^2\)

It was found that the high specificity associated with the ‘red-dot’ system was artificial, since the commenting system revealed that many of the location sensitive comments on images positive for fracture referred to the wrong location.

The receiver operating characteristic (ROC) method has been used to assess observer performance for many years and in recent time the free-response ROC (FROC) method has become popular due to the fact that it considers location information. In this study we compare novice observer performance pre- and post-training, while comparing ROC and FROC analyses.

### Method

34 radiography students from five Higher Education Institutions (HEIs) completed a pre- and post-training lesion localisation task. A monitor calibration was completed to the DICOM GSDF standard.\(^3\)

An anthropomorphic chest phantom (Lungman NJ, KyotoKagaku, Japan) was loaded with lung nodules and scanned on a low-dose CT protocol. 92 images (62 containing 1-3 simulated lesions, 30 with no lesion) were evaluated pre- and post-training.

#### Pre-training

Observers were given basic instructions to complete the lesion detection task; they were advised that they were looking for simulated nodules in CT images.

#### Training

Six hours of intensive training on ROC and FROC methods. Observers were trained in the appearance of simulated lesions and advised of lesion prevalence.

#### Post-training

This was completed 6-weeks after the pre-training evaluation to ensure that a suitable wash-out period had elapsed to prevent observers remembering appearances.\(^4\)

### Results

A statistically significant improvement in lesion detection performance was observed from pre- to post-training under the FROC paradigm.\(^5\)

#### Observer Performance Study

34 observers evaluated 92 images on two occasions (pre- and post-training) under the FROC paradigm.\(^5\)

Each session lasted 45 minutes and observers were advised to localise all areas (mark) they deemed suspicious of a simulated lesion, and score confidence (rating). Mark-rating pairs were classified as lesion-localisation (LL) or non-lesion localisation (NL) by an acceptance radius. Evaluations were completed using ROCView.\(^6\)

#### Statistical Analysis

Data was analysed using jackknife alternative FROC (JAFROC) analysis. The JAFROC figure-of-merit defines the empirical probability that a true lesion rating is higher than any false rating on normal images.\(^5\)

The highest-ranking inferred ROC analysis was performed for comparison. A difference in lesion detection was considered statistically significant with a test score below \(\alpha = 0.05\); this would control the probability of Type I error.

### Conclusion

The results of this study could be encouraging to the radiography profession, where training for participation in a ‘red-dot’ or commenting system may have the potential to improve the performance of novice observers.

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### References


