**Abstract**

The evaluation of chest radiographs for abnormalities consistent with dust-related illness is performed using the International Labor Office (ILO) International Classification guidelines. Despite a proficiency program and the use of standard films in classification, the method is subject to error between and within readers. We assessed inter and intra-reader variability in a cohort of 1,184 former and current taconite miners in Minnesota. Two NIOSH certified B readers served as primary reviewers of the films, with a third reader performing arbitration reads on 301 films. Primary readers blindly reread 149 films for quality assessment purposes. Inter-reader agreement on overall status of the film (normal/abnormal) was 87%, but 52% among films that had been classified as abnormal by at least one reader (kappa=0.6038). Reader agreement on parenchymal abnormalities improved with increasing level of profusion, with a kappa of 0.4253 on films read as 1/0 or above and a kappa of 0.3500 on films read as 2/1 or above. Agreement for pleural abnormalities (present/absent) had a kappa of 0.6157, and agreement decreased as BMI increased. Intra-reader agreement was consistently higher for films initially read as normal. The lowest level of agreement was seen between each primary reader and the arbitration reader, likely due to the higher level of difficulty in reading these films. Results indicate intra and inter-B reader variability is influenced by degree of morbidity in this work group.

**Methods**

- Initial reads performed by two NIOSH certified readers
- Assessment of abnormalities consistent with pneumoconiosis as agreed on by two of three readers
- 301 arbitration reads performed by third reader when primary readers disagreed
- 149 blind rereads for quality assessment used to analyze intra-reader agreement
- Parenchymal abnormalities: Presence of small opacities of profusion ILO category 1/0 or above
- Pleural abnormalities: Any pleural abnormalities consistent with pneumoconiosis
- Analyses calculated level of agreement between and within readers based on percent agreement and kappa values
- BMI calculated from measurements taken during clinic visit

**Results**

- B Reader variability greater in abnormal films, both between and within readers (Table 1A)
- Second reads more conservative (Table 1B and 1C)
- Reader variability greater in mild disease or difficult films as shown by low agreement in arbitration reads (Table 2)
- Reader variability in parenchymal results decreases as degree of opacity profusion increases (Table 3A and 3B)
- Reader variability in pleural results increases as a subject’s BMI increases (Table 4A and 4B)

**Conclusions**

- Level of inter and intra-B Reader agreement influenced by degree of morbidity and obesity
- B Reader variability could lead to misclassification of disease outcomes in lung disease studies
- Arbitration and profusion analyses show that consistent agreement is difficult in films with modest effects or mild disease, where exposure is likely to be smaller
- Misclassification of mild disease films makes it harder to get an accurate portrait of low dose exposure effects
- Future analyses will investigate whether B readers are more likely to classify borderline disease films as normal or abnormal, and what effect this will have on an overall dose-response relationship between taconite dust and radiographic lung abnormalities

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