Effect of Dynamic Workstation Use on Radiologist Detection of Pulmonary Nodules on CT

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Sedentary lifestyles increase cardiovascular and all-cause mortality. Diagnostic radiologists have one of the most sedentary working environments in medicine.

Increasing radiologist physical activity would have far reaching personal health implications.

Ways to increase radiologist physical activity such as by using dynamic exercise workstations have been gaining popularity.
The effects of these dynamic workstations on radiologist accuracy and speed have not been examined in depth.

This study was designed to analyze the effects of radiologists utilizing a dynamic treadmill workstation to increase physical activity on accuracy and interpretation of pulmonary nodules.
Materials and Methods

• This project was HIPAA compliant and approved by the NMCP IRB (Protocol: NMCP.2016.0095).

• Three radiologists performed a retrospective review of 55 CT exams of the chest originally obtained for lung cancer screening in patients at increased risk of lung cancer.

• These studies were reviewed both while sitting at a routine workstation and also while walking at a dynamic treadmill workstation at a speed of 1.5 miles per hour.

• The number of pulmonary nodules detected was recorded and compared between each condition.
Further analysis included a breakdown of the number of solid nodules vs the number of subsolid nodules detected between each condition.

The interval between the sitting and walking conditions was set at least 2 weeks apart.

Follow up recommendations and the time required to complete each examination were analyzed and compared between the two conditions in order to evaluate any impact that a dynamic workstation had on interpretation.
Results

- There was no statistically significant difference in the number of nodules detected while walking versus seated, with a mean of 0.93 more nodules detected per study while seated ($p=0.426$).

- Similarly, there was no statistically significant difference in the number of solid nodules detected between walking and sitting with a mean of 0.28 more nodules detected while seated ($p=0.793$).
Results

• Intraobserver follow-up recommendations were considered consistent to highly consistent between sitting and walking (Cronbach alpha values of 0.943 for reader 1, 0.946 for reader 2, and 0.812 for reader 3).

• There was moderate interobserver agreement between the reviewers’ recommendation for seated vs walking conditions with a Cohen’s kappa value of 0.555 (p<0.001)
Results

The bar chart shows the mean (SEM) for different categories:
- Nodules Seated
- Nodules Walking
- Solid Nodules Seated
- Solid Nodules Walking

The chart indicates a comparison between sitting and walking conditions for nodules and solid nodules.
The mean interpretation time per CT was 0.75 minutes shorter while walking (p<0.001).
Conclusions

- There was no significant difference in detection of total number of pulmonary nodules or resultant nodule follow up recommendations between sitting versus walking at a dynamic workstation.

- Unexpectedly, there was a significant difference in time taken to complete each examination, with interpretation during walking taking less time than sitting.