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# Acute pulmonary embolism: a specific scent?

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## Introduction

Computed tomography pulmonary angiogram (CTPA) scans performed to diagnose acute pulmonary embolism (PE) at the emergency department, prove PE in less than 30%. Electronic nose technology might aid in the decision to perform a CTPA in PE suspected patients.

## Methods

Patients seen at the emergency department that received a CTPA scan due to suspected PE (based on increased D-dimer or Wells-score) breathed normally into an electronic nose (the Aeonose™, The eNose Company, Zutphen, the Netherlands, see figure 1) for five minutes. The Aeonose™ measurement data were compared with the CTPA result to train an artificial neural network. Resulting Aeonose™ classifications into PE or no PE were obtained using Leave-10%-Out cross validation. For full details on the analysis see Kort et al.[1].



Figure 1: The Aeonose™

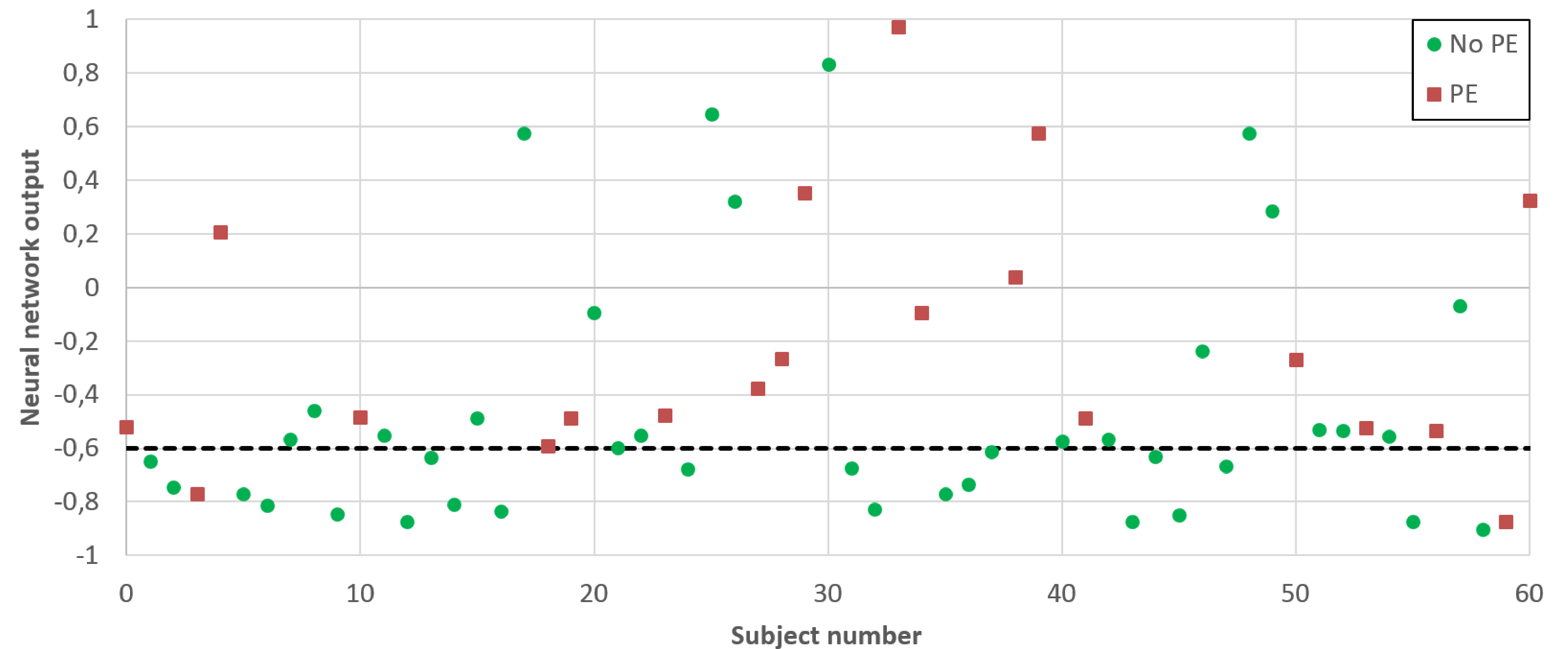


Figure 2: Classifications of the Aeonose™ measurements. The horizontal axis shows the subject number. The vertical axis shows the classification of the subject by the neural network (visualized as a score between 1 and -1). Red squares indicate subjects with PE on CTPA. Green circles indicate subjects without PE on CTPA. The dashed line indicates the optimal threshold resulting in a sensitivity of 90% with a specificity of 54%.

## Results / Discussion

61 Subjects (mean age  $61.8 \pm 15.5$  years; 56% male) were included and PE was confirmed on CTPA in 20 (33%). Median D-dimer was 1427 (IQR 704 – 3244)  $\mu\text{g/L}$ . Median Wells-score was 3.0 (IQR 3.0 – 4.5). Classifications of the Aeonose™ measurements are provided in figure 2. The area under the ROC curve was 0.73. The optimal threshold to rule out PE resulted in a sensitivity of 90% with a specificity of 54%, positive predictive value of 49% and negative predictive value of 92%. Thus, 24 subjects (39%) were classified as not having PE of which 2 cases did have PE on CTPA (false-omission rate: 8.3%).

## Conclusion

The use of electronic nose technology to rule out pulmonary embolism seems promising. Caution is warranted as blind predictions haven't been accomplished yet. Follow-up research is currently underway.