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MEETING ABSTRACT

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# A wearable microwave detector for diagnosing thoracic injuries-test on a porcine pneumothorax model

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## Background

In the prehospital setting, a point-of-care diagnostic test is needed to diagnose pneumothorax (PTX) and monitor its progression to prevent unnecessary patient morbidity and mortality. Ultrasonography is more sensitive than supine chest x-ray for diagnosing PTX, but the accuracy depends on the experience of the operator. Therefore, a non-operator dependent instrument would be valuable for detection and continuous monitoring of an evolving PTX.

## Study objective

To evaluate the potential of a new microwave technology for diagnosing PTX.

## Methods

An experimental PTX model was set up in two anesthetized pigs. A belt with eight microwave antennas was strapped around the pig's chest. Air was insufflated into a catheter in the right pleural space in twelve incremental steps (PTX volumes: 50, 100, 150, 200, 250, 300, 400, 500, 750, 1000, 1500, 2000 mL). Each injection was followed by a measurement with the microwave detector. A computer-based classification algorithm was used to distinguish between the measurements using a leave-one-out approach (i.e. the sample to be classified was not included in the training data matrix), where each PTX volume was treated as an individual class.

## Results

The microwave belt was able to differentiate between normal lungs and PTX in both animals with an overall diagnostic accuracy of 100 % (i.e. a sensitivity and specificity of 100%). Furthermore, the classification accuracy for predicting the size of PTX was 100% and 98% for each pig, respectively.

## Conclusion

The microwave technology proved promising in diagnosing and predicting size of PTX ranging from 50 mL to 2000 mL. This within-model experiment only differentiated PTX and normal lungs in individual pigs and not between different animals. A larger validation study needs to be done to further evaluate the diagnostic accuracy of the microwave detector.

## Institution

This preliminary study was conducted at Sandnes Education and Research Center Høyland (SEARCH), Sandnes, Norway.

## Conflict of interest

The authors state no conflicts of interest.

## Authors' details

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