



Dosing of Antibiotics in Exhaled breath: a pilot study (ANTIBEX-trial)

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Introduction

- Infections are a frequent and possibly life-threatening problem in intensive care unit patients, and antibiotic therapy is one of the cornerstones of the treatment.
- Therapeutic drug monitoring has been proposed to optimise antibiotic therapy but measuring tissue concentrations remains difficult (1).
- The ExaBreath® device (SensAbues AB, Sollentuna, Sweden) has proven reliable for collecting exhaled breath to quantify recreational drugs but has not been evaluated for measuring antibiotic concentrations (2,3).

Objective

- To explore the feasibility and safety of the ExaBreath®-device to determine antibiotic concentrations in exhaled air.

Methods

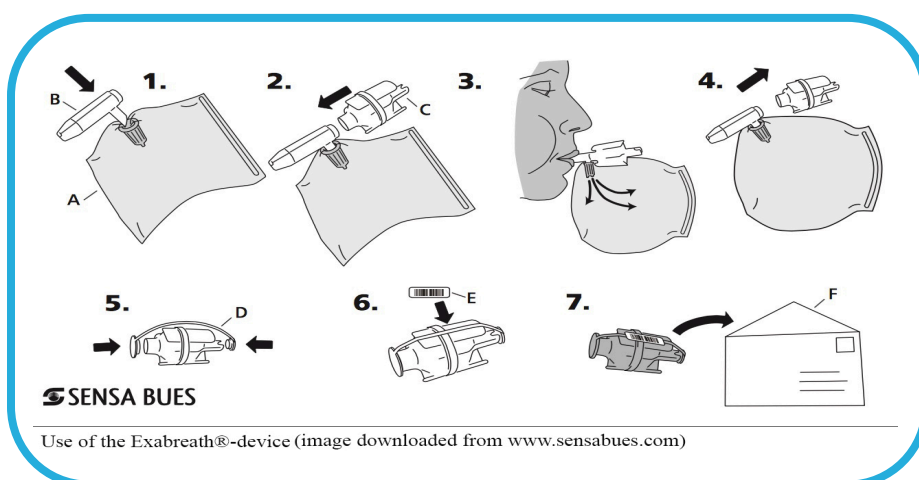
- Ten spontaneously breathing patients treated with piperacillin/tazobactam or meropenem and considered capable exhaling for 3 minutes through the ExaBreath®-device participated.
- Patients exhaled through the device until the control container was full (which equates to 30L of exhaled breath), or until the patient wanted to stop.
- Samples were analyzed using liquid chromatography high resolution mass spectrometry. The devices were opened and the filters were extracted with 2 mL 80:20 4% NaCl in water:isopropanol containing piperacillin-D₅ and meropenem-D₆ as internal standards. The analysis was performed on a Thermo Q-Exactive.

Results

- Eight patients were treated with piperacillin/tazobactam, 2 with meropenem.
- Six out of 10 patients were able to exhale in a standardized way in the device. The remaining 4 did not exhale correctly, were tired or the control container filled too slowly.
- No complications related to the procedure occurred.
- Piperacillin and meropenem are present in the exhaled air in the pg to ng/filter range.

Conclusion

- This pilot trial confirmed that it is possible to use the ExaBreath®-device in critically ill patients, although there were some practical difficulties in exhaling in a coordinated way in 4 out of 10 patients.
- Antibiotic concentrations were detectable in exhaled breath in the pg to ng/filter range.
- Further research is necessary to evaluate the potential use of the ExaBreath device in the treatment of infections in the ICU. Sampling patients on mechanically ventilated patients could bypass the difficulties in exhaling in a non-standardized way.



References

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2. Beck O, Stephanson N, Sandqvist S et al. Detection of drugs of abuse in exhaled breath using a device for rapid collection: comparison with plasma, urine and self-reporting in 47 drug users. *J Breath Res* 2013; 7(2):026006.
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