Oral Abstracts

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METHANOL POISONING DIAGNOSIS MADE EASY – THE FORMATE BEDSIDE STRIPS: NEW DATA OF A NOVEL METHOD

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Background
Recent years, the global problem of methanol poisonings has gained increased attention, both in the medical literature, but also in the news. The diagnostic alternatives are not satisfactory overall, and more or less non-existing in the low- and middle income countries. We have therefore developed a bedside diagnostic for measuring formate, the toxic metabolite of methanol. The present prototype represents the second generation strip where the problem with short shelf-life on the original model has been solved.

Methods
The strips are constructed in such a manner that the red blood cells will be filtered from the reactants, making it possible to use full blood (one drop/40µL) without spinning before sampling. The current test of the prototype had two major purposes: To test the sensitivity on different levels of formate, the specificity towards other relevant substances, and a blinded test on four health-care professionals. *The specificity-testing* was performed with: D-L-lactate, betahydoxy-butyrate, glycolate, pyroglutamate, ascorbic acid, ethanol, methanol, ethylene glycol, isopropanol, glycerol, di-ethylene glycol, acetone, semicarbacide, glycolic acid, oxalic acid, methylene blue, fomepizole, and EDTA. Further, we evaluated the *potential inhibition of the enzymatic reaction* from fomepizole, isoniazid, Na-nitroprusside, methylene blue, ascorbic acid, Na-salicylate, nicotine, cotinine, K-thiocyanate, oxalic acid, carbamide, creatinine, and uric acid. *The blinded samples* were performed on one ICU nurse and three intensivists, each were given 12 spiked samples of full blood containing various amounts of formate. One of the tested persons were colorblind.

Results
The sensitivity of the strips was excellent, with an increasing color reaction with higher concentrations of formate. There was no influence on the specificity testing on any of the tested substances (i.e. no false positives). Uric acid and ascorbic acid, in high concentrations inhibited the color development, leading to slower development of color and underestimation of the formate concentration at low and at high concentrations of formate. Thiocyanate and nitroprusside gave slight inhibition, whereas the others gave no detectable inhibition. The blinded tests indicated that observers could easily distinguish between strongly positives and negative samples, but we observed notable inaccuracies in quantification between 2mmol/L and 5mmol/L.

Discussion
The results from the testing on the prototype were promising: No false positives from other substances capable of causing acidosis. There was decreased performance of quantification in the presence of inhibitors, exogenous and endogenous in high or pathological concentrations, but the strips could still give clear indications of formate if present. The blind-test with the clinicians was encouraging, but with inaccuracies.

Conclusion
We are encouraged by the results. We believe the inaccuracies reflect the imperfection of the pilot production processes and will be remedied by industrial-scale production. We expect the formate test will be ready for final production, testing and regulatory approval within the nearest future, with market release in 2017.

Conflict of interest
The presenter declares no conflict of interest. The production and sales will be non-for-profit for the inventors: All future income from the product is donated to a charitable fund meant to support the availability of the diagnostic tool to the developing world.

Learning Objectives:
1. After the session the participants should be able to explain the use of the formate bedside strips for diagnosing methanol poisoning
2. After the session the participants should be able to explain the pros and cons with the present strips
3. After the session the participants should be able to describe the most important pitfalls to such a diagnostic tool

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