AMMONIA ANALYSIS FROM BREATH

www.breathdx.com
OVERVIEW

• About BreathDX
• The AmBeR® system
• What we would like to find out
• How we would like your help
About us

- BreathDX (UK) Ltd
- Founded in Bristol in January 2015
- Private company
- Own the licence to the AmBeR breath ammonia measurement technology
- Developing this technology for application in metabolic disorders
Who we are

GM/S&M
Des McCluskey

Strategy/BDM
Dr. Dara FitzGerald

CTO
Prof. Tony Killard

Finance
Andrew Lennard

PM
Dr. Termeh Ahmadraji

Device engineer
2016

Sensor engineer
2016

QA/QC
2016

Clinical affairs
2018

Sales team
2017-2018
What is AmBeR

- AmBeR is a sensor-based system
- It measures ammonia concentration in breath
- It has four main parts
  - Instrument
  - Sensor (cartridge)
  - Sampling system
  - Computer (laptop) with software*
AmBeR system
AmBeR system

Laptop

Instrument

Sensor cartridge

Software

Sampling system
How does it work?

• The sampling system
  – Controls the amount of breath sample that is collected
  – Most of the first part of the breath sample is not collected as this contains ammonia from your mouth
  – Only the last part of the breath sample is collected as it comes from down in your lungs
  – This part of the sample is measured
How does it work?

- **The sampling system**

  - Breath collects in tube of known volume
  - Air flows in behind the breath sample to prevent it condensing
  - Filter stops saliva and bacteria getting into instrument
  - Breath in through mouth piece
  - Breathing is normal exhalation
  - Only the end of the breath sample is kept in the tube
  - Most of the sample comes out here
  - The last part of the breath sample goes into the instrument

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How does it work?

- The instrument
  - Controls the flow of breath and air across the ammonia sensor
  - A fan controls the flow through the instrument
  - A valve controls the flow of breath or air across the sensor
How does it work?

• The instrument

- Air inlet
- Valve turner
- Air/breath switches in here
- Breath sample inlet
- Sensors detect valve position
- Slot for sensor cartridge
- Motor turns valve
- Electronics
- Fan inside housing to control flow rate
How does it work?

• The sensor
  – Printed, disposable sensor cartridge
  – Changes its electrical conductivity when exposed to ammonia
  – It is very sensitive
  – It can detect a few parts per billion of ammonia in breath
  – 1 part per billion is equivalent to three seconds in 100 years!!!
How does it work?

• The sensor

Plastic cartridge for holding, inserting and removing from instrument
Protects sensor layer from damage

Green sensor ink which detects ammonia – don’t touch!

Silver conductive connectors to connect sensor layer to the instrument
Making a measurement

- A new cartridge is inserted into the instrument
- Software is set up with subject details and test settings
- Test begins
Making a measurement

When test begins, the following things happen:

The fan starts drawing air across the sensor
The instrument takes a measurement of the sensor in air (baseline) – RED light

When prompted by the AMBER light, the user prepares to give a breath sample by gently inhaling as normal (about 2 seconds)

When prompted by the GREEN light, the user gently and naturally inhales into the instrument (about 4 seconds)
Making a measurement

The valve switches from the air inlet to the breath sample inlet and the breath sample is drawn across the sensor for a defined period of time under the RED light. The valve then switches back to air.

The user gets ready for their next breath sample.

This cycle is repeated eight times. The total test time is currently around five minutes.
Making a measurement

• Breath sample measurements will look like this
What next?

- AmBeR can measure ammonia in breath
- We think this can be used as an easier way of measuring ammonia levels in the body
- However, no-one has yet demonstrated this
Firstly, we want to find out if the levels of ammonia in blood relate to those in breath.

We know that bacteria in the mouth also produce ammonia which might affect the results.

We then want to see if the levels of ammonia we measure relate to patient health status.
What next?

• If measuring breath ammonia can be used to help manage ammonia levels...

• We want to develop an AmBeR system that patients and families can use in their own home

• Simple to use and does not require a separate computer
Today

- We would like to hear your thoughts on…
  - The AmBeR system
  - What we are trying to do with it
- We would like you to give us advice on…
  - How you would like it to work
  - How we can make it better
  - What issues are important to you and how we can better address them