Imperial College London

Breath testing for pancreatic cancer: the VAPOR study

Volatile organic compound assessment in pancreatic ductal adenocarcinoma

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Pancreatic Cancer UK

PANCREATIC CANCER – THE SCALE OF THE PROBLEM

Non-specific signs & symptoms makes early diagnosis a challenge

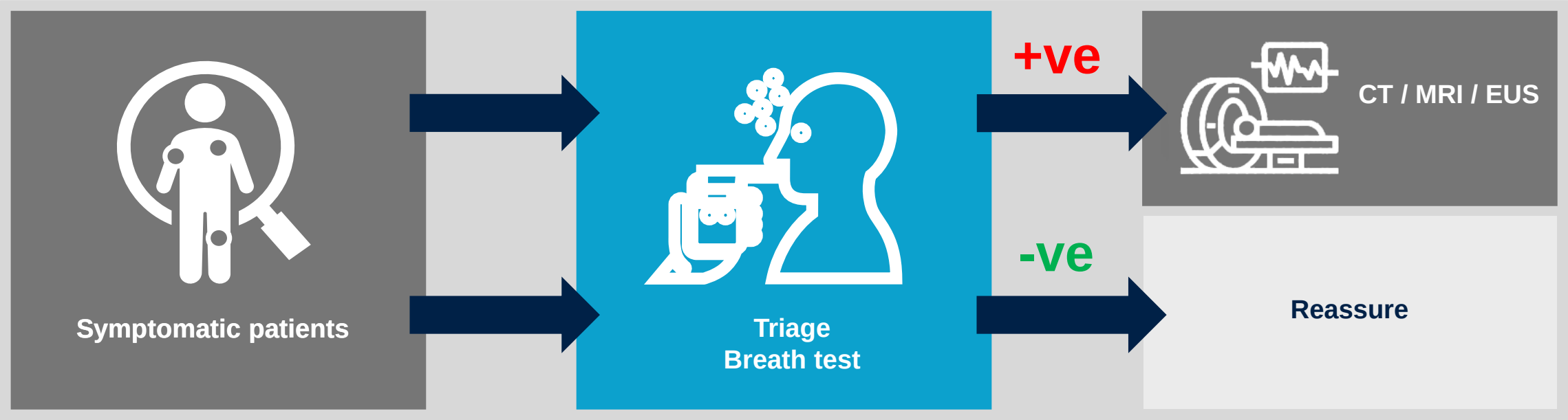
Late diagnosis is common:

47% patients present with **Stage 4, incurable** disease

Current lack of **biomarkers** with sufficient sensitivity or specificity and **no screening programme**

5-year survival just **7.3%** makes pancreatic cancer the **fifth** commonest cause of cancer death

OUR PROPOSED SOLUTION – NON-INVASIVE BREATH TEST



Solution:
Breath Test

- **Triage test**
- Non-invasive, highly acceptable in **primary care** MAGIC trial
- Detects **volatile organic compounds (VOCs)** released from the tumour and its environment at early stage

Potential for **earlier diagnosis, improved survival, and cost savings to the NHS**

OUR PROPOSED SOLUTION – NON-INVASIVE BREATH TEST

Breath collection system

- Less than 30 seconds breathing into bag
- Good utility
- Low level of contamination
- Low cost

Breath transfer

- Stainless steel
- 89 mm long
- 64 mm outer diameter

- No VOC loss for 3 months

Breath analysis

- Automated system
- Quality management
- Standard operating procedures

HIGH-THROUGHPUT AUTOMATED SYSTEM

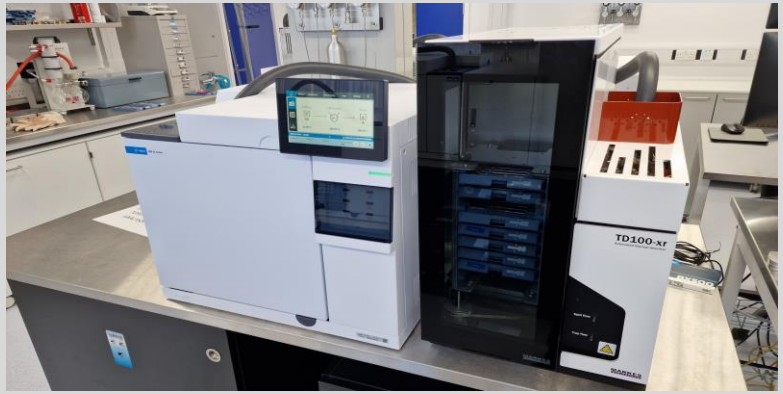
Conditioning tubes

80 tubes every 3 hours

Robot for addition of standards in tubes

>300 tube per day

Autosampler per analytical instrument



100 tube position instrument

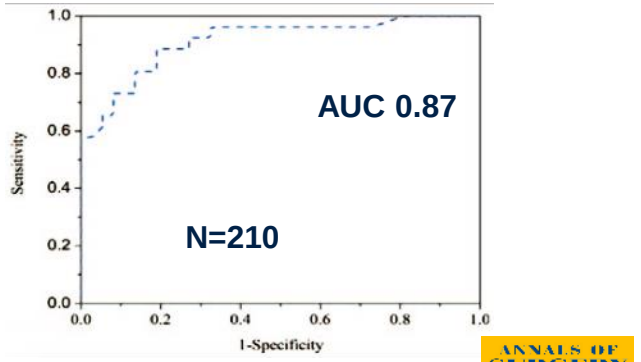
Nine GC-TOF-MS replica instruments

In dedicated VOC laboratory

PROFILING CLINICAL STUDIES

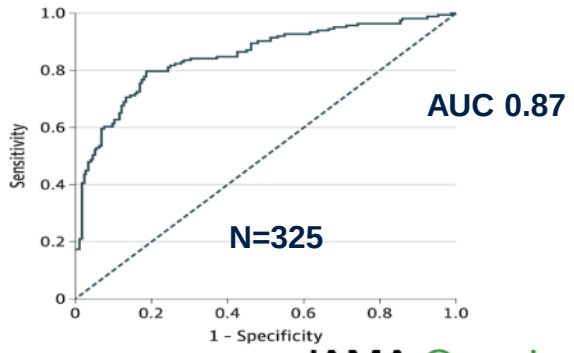
Oesophagogastric adenocarcinoma

Biomarker discovery & development of diagnostic model



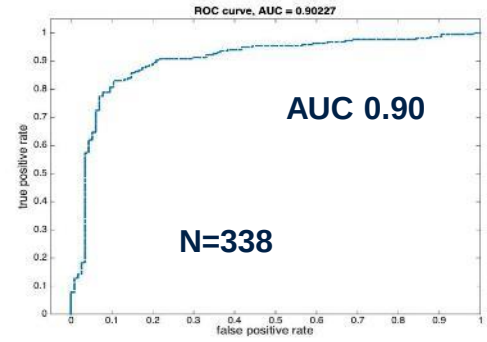
ANNALS OF SURGERY

Multicentre external validation of biomarkers



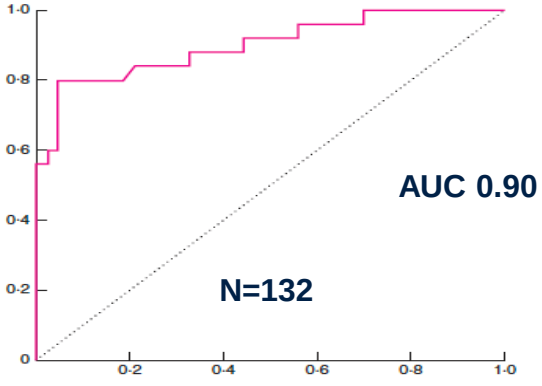
JAMA Oncology

Diagnostic model using high throughput system



Pancreatic adenocarcinoma

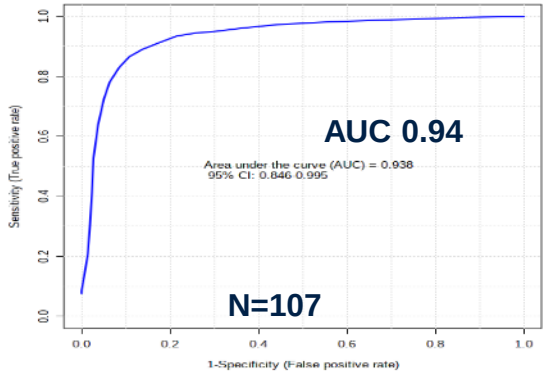
Internal validation study



BJS

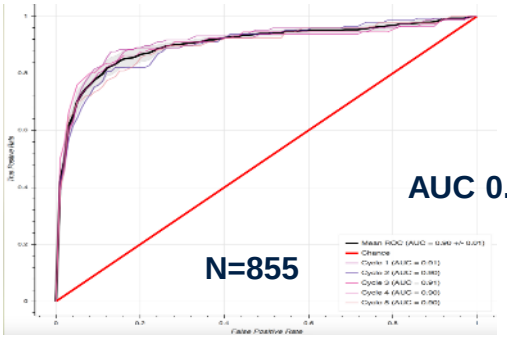
Hepatocellular carcinoma

Internal validation



Colorectal adenocarcinoma

Internal validation



Gastroenterology aga

VALIDATION STUDIES

Model optimisation multicentre studies

Oesophagogastric cancer	Pancreatic cancer	Colorectal cancer	Liver cancer
AROMA 678 patients	**VAPOR** 771 patients	**COBRA:** 720 patients	**VOCAL** 750 patients

Triple-blind validation multicentre studies

Patient, breath sampler, VOC analyst, cancer classifier are unaware of disease status

AROMA	VAPOR	COBRA	VOCAL
6648 patients	6079 patients	6850 patients	8334 patients

Dedicated validation multicentre studies for sub-groups

T1 oesophageal cancer and high-grade dysplasia	Oesophageal squamous cell cancer
NEED 288 patients	**ViSON** 518 patients

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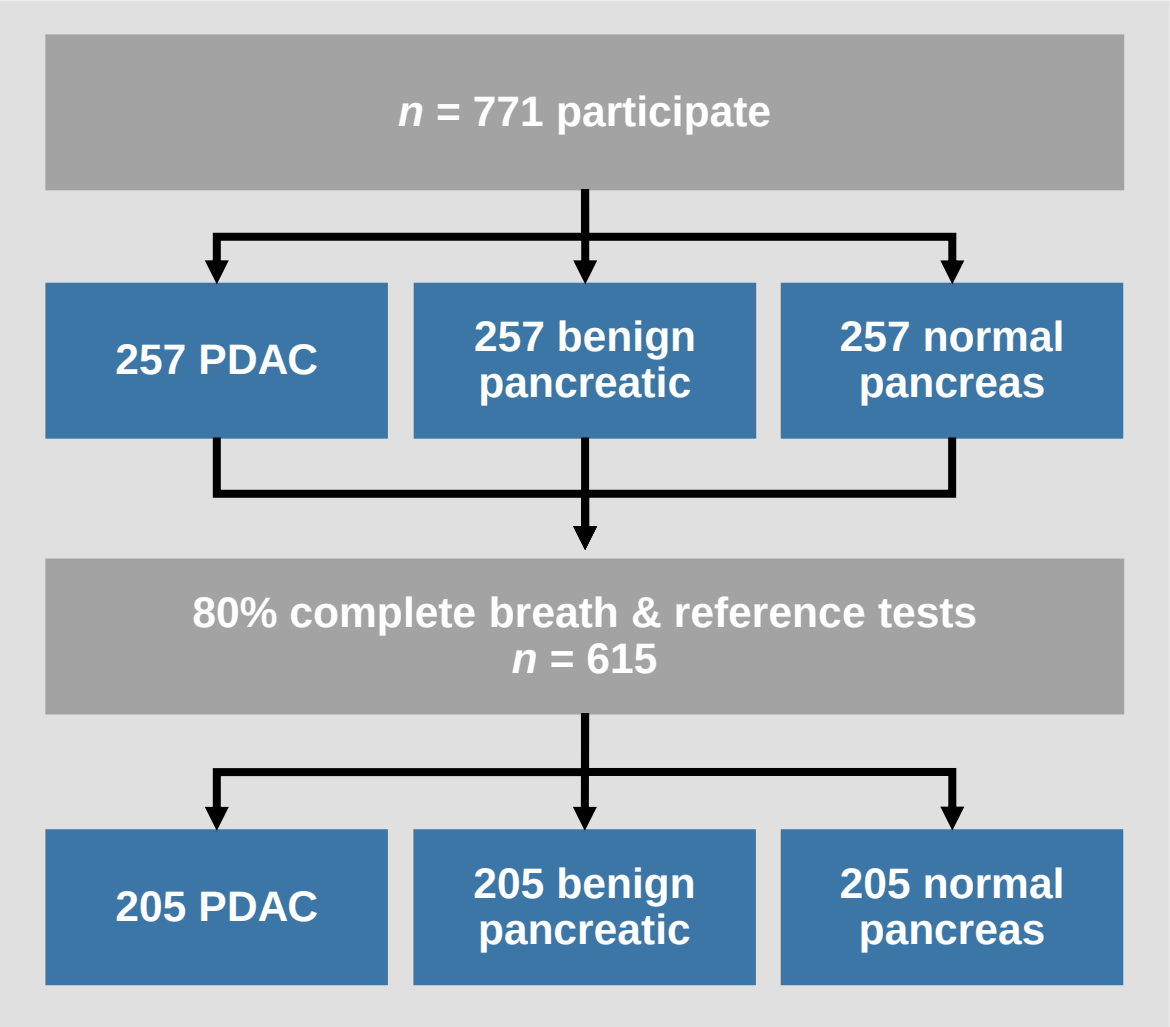
VAPOR 1 CLINICAL STUDY



NHS Foundation Trust

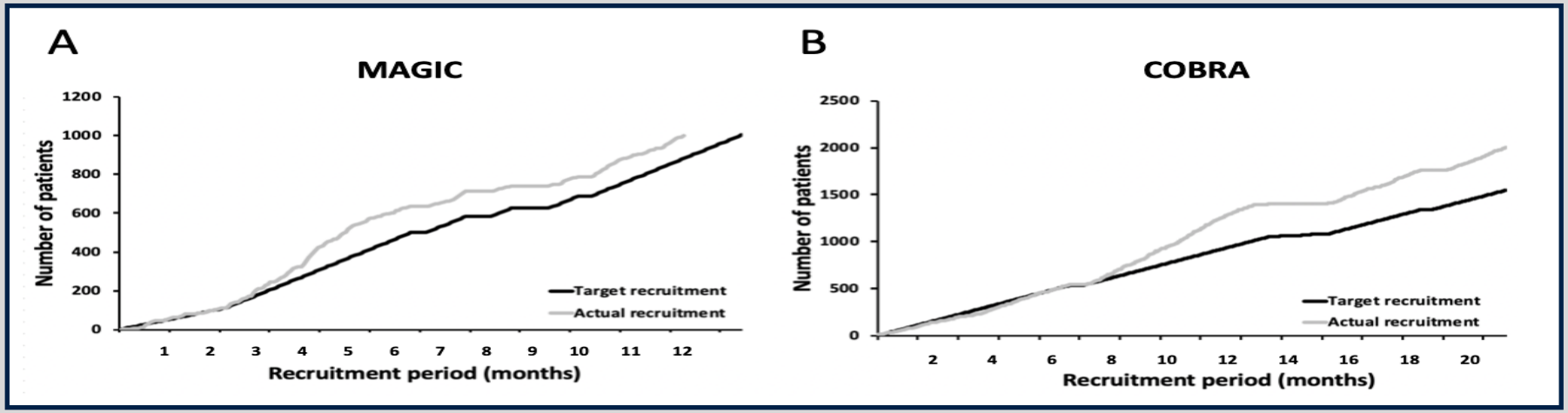
- Imperial College Healthcare
- University Hospitals Birmingham
- Royal Surrey
- The Newcastle upon Tyne Hospitals
- Manchester University
- University Hospital Southampton
- Sheffield Teaching Hospitals
- Liverpool University Hospitals
- North Tees and Hartlepool

GIG CYMRU NHS WALES

Bwrdd Iechyd Prifysgol Bae Abertawe
Swansea Bay University Health Board

SCALING UP TO CLINICAL PRACTICE

Acceptability testing



99% very easy / easy & very comfortable / comfortable to use

Usability and regulatory

- Real world human factors studies: **triage test** in **primary care**
- Economic modelling: £155M annual **cost-saving for the NHS** in upper GI pathway
- Laboratory **ISO-17025** accreditation in progress
- Registering AROMA, VAPOR and COBRA with **MHRA** [Medicines and Healthcare products Regulatory Agency]

NEXT STEPS: Completion of validation clinical studies & regulatory approvals

Imperial College London

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