Breath test for the diagnosis
of oesophageal squamous cell carcinoma

Yan Mei Goh
Diagnosis of oesophago-gastric cancer

- Upper GI symptoms account for 3% of consultations in primary care
- 11,500 diagnosed annually in the UK

ORIGINAL ARTICLE

Variation in gastroscopy rate in English general practice and outcome for oesophagogastric cancer: retrospective analysis of Hospital Episode Statistics

Mustafa Shawihi,1 Elizabeth Thompson,2 Neil Kapoor,3 Geraint Powell,2 Richard P Sturgess,3 Nick Stern,3 Michael Roughton,4 Michael G Pearson,2 Keith Bodger1

Gut 2014; 63:250-61
Diagnostic dilemma in cancer

- High incidence non-specific symptoms
  + Triage test
- Low incidence cancer

Tissue diagnosis
Concentrated breath in a cold trap
Analyzed with GC

>100 volatile organic compounds (VOCs)
Breath analysis
Mass Spectrometric Analysis of Exhaled Breath for the Identification of Volatile Organic Compound Biomarkers in Esophageal and Gastric Adenocarcinoma

Sacheen Kumar, MRCS,* Juzheng Huang, PhD,* Nima Abbassi-Ghadi, MRCS,* Hugh A. Mackenzie, MRCS,* Kirill A. Veselkov, PhD,* Jonathan M. Hoare, PhD, FRCP,† Laurence B. Lovat, PhD, FRCP,‡ Patrik Španěl, PhD,§ David Smith, PhD, FRS,¶ and George B. Hanna, PhD, FRCS*

A. Model subset

B. Validation subset

AUC = 0.92

AUC = 0.87
Noninvasive Exhaled Breath Volatile Organic Compound Analysis for the Diagnosis of Oesophagogastric Cancer

Sheraz R. Markar, PhD; Tom Wiggins, PhD; Stefan Antonowicz, PhD; Sung-Tong Chin, PhD; Andrea Romano, PhD; Konstantin Nikolic, PhD; Benjamin Evans, PhD; David Cunningham, PhD; Muntzer Mughal, MD; Jesper Lagergren, PhD; George B. Hanna, PhD

Diagnostic accuracy 85%
Breath Volatile Organic Compound Profiling of Colorectal Cancer Using Selected Ion Flow-Tube Mass Spectrometry

Sheraz R. Markar, PhD, Sung-Tong Chin, PhD, Andrea Romano, PhD, Tom Wiggins, MRCS, Stefan Antonowicz, MRCS, Paraskevas Paraskeva, PhD, Paul Ziprin, FRCS, Ara Darzi, FRCS, and George B. Hanna, PhD

Annals of Surgery 2017

Diagnostic accuracy 83%
Profile of exhaled-breath volatile organic compounds to diagnose pancreatic cancer


Diagnostic accuracy 90%
Breath collection system

Robust system for transport
Stability for 4 weeks
Implementation into clinical practice

One breath triage test for multiple cancers
Breath test assisted pathway

Patients with alarming symptoms → Endoscopy / CT

Patients with non-specific symptoms → Triage

Breath test → PPI Re-test
Plan for squamous cell cancer breath test

Clinical Phenotyping Study

- Oesophageal SCC: n=60
- Head and Neck SCC: n=60
- Healthy Control: n=60
- Positive Control: n=30
Breath collection system

Robust system for transport
Stability for 4 weeks
Saliva collection system

Robust system for transport
Thank you