

CAN AN AUTOMATED FAECAL IMMUNOCHEMICAL TEST (FIT) DETERMINE WHETHER FAECAL HAEMOGLOBIN (f-Hb) CONCENTRATIONS CAN AID IN STRATIFYING SYMPTOMATIC PATIENTS REFERRED FOR COLONOSCOPY

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INTRODUCTION

This study aimed to determine whether faecal haemoglobin concentrations (f-Hb) could aid in stratifying symptomatic patients referred for lower gastrointestinal (LGI) tract endoscopy and whether it could be used to fast-track the need for an endoscopy in those with an increased suspicion of malignancy.

METHOD

1000 patients with a variety of gastrointestinal symptoms, referred for LGI endoscopy within Lanarkshire were sent sampling pickers for f-Hb (**Figure 1**) with their bowel preparation and instructions. They were asked to take a faeces sample using this picker and return it to the laboratory at Monklands Hospital in pre-paid padded envelope by first class post. f-Hb were measured on single samples from 507 patients who also underwent a LGI endoscopy within NHS Lanarkshire during this period in 2013-14. The age of the patients ranged from 15 to 89 years (median: 60). Samples were stored on receipt at 4°C and f-Hb was measured using an automated Faecal Immunochemical Test (FIT) on the HM-JACKarc analyser (Kyowa Medex, Japan) as a batch on a weekly basis (**Figure 2**). Following LGI endoscopy, patient's notes were reviewed and each classified according to colonoscopy and pathology findings, these were then compared with the f-Hb results.



Figure 1 - Sampling pickers for f-Hb



Figure 2 - HMJACKarc Analyser

Following LGI endoscopy, patient's notes were reviewed and each classified according to colonoscopy and pathology findings, these were then compared with the f-Hb results.

RESULTS

Results showed f-Hb increased significantly with age ($p=0.018$) and was higher amongst men ($p<0.0001$); on average men in the study were 5 years older than women. F-Hb was higher in those with benign and malignant organic bowel disease ($p<0.0001$) but had no association with diverticular disease. No association was found between f-Hb and number and/or size of polyps.

11 (2.2%) participants were found to have adenocarcinoma, all of whom had f-Hb $>150 \mu\text{g Hb/g}$ faeces (maximum value = $881.6 \mu\text{g Hb/g}$) thus illustrating potential use in the referral and treatment pathway for colorectal cancer. At a cut-off of $10 \mu\text{g Hb/g}$, the NPV for cancer and high-risk adenoma combined was 94% with a sensitivity of 54% and a specificity of 78%; receiver operating characteristic curves are presented to illustrate this relationship (**Figure 3**).

One patient had a histologically confirmed neuroendocrine tumour and a microcytic anaemia, their f-Hb result was $1.8 \mu\text{g Hb/g}$ faeces indicating that the test is specific to identifying gastrointestinal malignancies.

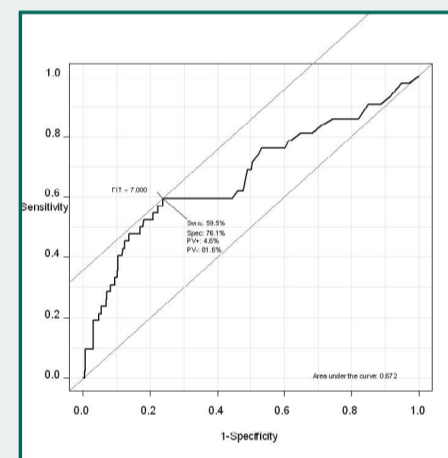


Figure 3 - ROC Analysis - Group classified as Gastrointestinal Malignancy or High Risk Adenoma

DISCUSSION

The nature of these results in identifying which of the cohort were likely to have a malignancy has resulted in a proposal to incorporate a f-Hb measurement by FIT into the referral pathway for LGI endoscopy. Patients with Cancer and other significant gastrointestinal diseases (High risk adenoma, low risk adenoma and inflammatory bowel diseases) have high f-Hb concentrations. However ROC curve analysis with Areas Under the Curve (AUC) showed that f-Hb is a poor rule-in test (sensitivity of 54% and a specificity of 78%), however a Negative Predictive value of 100% for Cancer and 94% for Cancer and High Risk Adenoma combined showed that the FIT test has significant potential to be used as a rule out test for these conditions, thus reducing unnecessary endoscopy and may be used in conjunction with other tests (e.g. Calprotectin) in a diagnostic pathway. An example of such a pathway is presented in **Figure 4**.

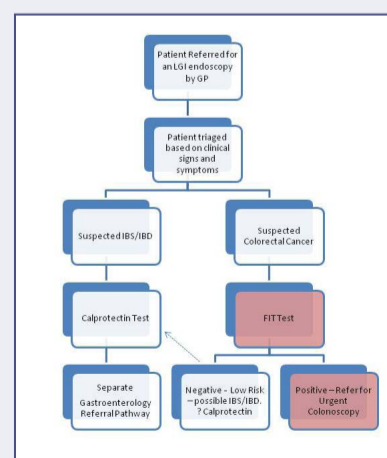


Figure 4 - Proposed Patient Investigation Pathway including FIT

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