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Introduction Oesophageal adenocarcinoma commonly arises from a premalignant lesion known as Barrett's oesophagus. Many patients are asymptomatic and present to the clinic with very advanced disease and poor prognosis. Deoxycholic acid (DCA) is a component of gastric refluxate, implicated as a tumour promoter for oesophageal adenocarcinoma. We had previously demonstrated that DCA disrupts Golgi structure and consequently impairs protein secretion and glycosylation processes. Impairment of these fundamental cell processes are implicated in metaplasia, dysplasia and carcinogenesis. To exploit this phenomenon in order to identify a novel biomarker we used an informatic approach. We identified a Golgi-associated protein, GOLPH2 whose expression is elevated in tissue from patients with Barrett's oesophagus and oesophageal adenocarcinoma.

Aims/Background GOLPH2 is localised to the Golgi and is not normally secreted. It has been found to be secreted and detected in serum from patients with hepatocellular carcinoma. We hypothesised that DCA disruption of the Golgi structure would result in cleavage and secretion of GOLPH2 thus acting as a potential serum biomarker. The localisation of GOLPH2 to the Golgi membrane suggests it functions in protein processing. We sought to determine the expression and localisation of GOLPH2 in patient tissue and to elucidate the mechanisms of secretion in oesophageal cell line models of squamous, metaplasia dysplasia and adenocarcinoma.

Method Golgi structure and GOLPH2 expression were examined in tissue from patients with Barrett' metaplasia, high grade dysplasia (HGD) and adenocarcinoma by immuno fluorescence.

GOLPH2 expression, localisation and secretion was assessed in normal squamous, Barrett's oesophageal and adenocarcinoma cell lines in response to DCA To determine the mechanism of GOLPH2 secretion, GOLPH2 mutant constructs were used.

Results The Golgi structure was intact in normal oesophageal and metaplastic tissue but fragmented in dysplastic and adenocarcinoma tissue. GOLPH2 was localised to the Golgi in normal and metaplastic tissue whereas localisation of GOLPH2 with the Golgi was lost in dysplastic and adenocarcinoma tissue. GOLPH2 expression was up-regulated in areas of differentiation and invasion in tissue from Barrett's patients. GOLPH2 was localised to the Golgi in all oesophageal cell lines but endogenously secreted by Barrett's oesophagus and adenocarcinoma cell lines only. DCA altered cellular localisation of GOLPH2 and caused secretion from normal oesophageal cells. To determine the mechanism of GOLPH2 secretion, GOLPH2 mutant constructs were used and the cleavage site was identified as the Pro-protein convertase (PC) site.

Conclusion In conclusion, altered expression, localisation and secretion of GOLPH2 in Barrett's oesophagus and oesophageal adenocarcinoma suggests its potential use as a serum biomarker to identify asymptomatic patients with oesophageal disease. Up-regulation of GOLPH2 expression at sites of

differentiation and invasion suggests a role in these processes in progression of this disease.