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DEVELOPMENT OF A NEW BIOCHIP ARRAY FOR THE SIMULTANEOUS DETECTION OF PEPSINOGEN I, PEPSINOGEN II AND GASTRIN 17

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INTRODUCTION

- Atrophic gastritis is a condition that is associated with a significantly higher risk of developing gastric cancer; the fifth most common cancer worldwide.
- Atrophic gastritis involves a loss in the gastric glands, affecting the secretion of pepsinogen II (PGII) from all areas of the stomach and pepsinogen I (PGI) and gastrin 17 (G17) more specifically from the corpus and antrum.
- During atrophic corpus gastritis, the levels of PGI in circulation are decreased. The ratio of PGI to PGII (which is produced by chief cells in the gastric mucosa) is also lowered. G17 is a crucial peptide hormone of the gastrointestinal tract and is secreted by the gastrin cells in the antrum. During antral atrophy the levels of G17 are ultimately decreased.

These serum biomarkers therefore, are valuable in the screening of atrophic gastritis and can provide a comprehensive diagnosis on the condition of the stomach mucosa.

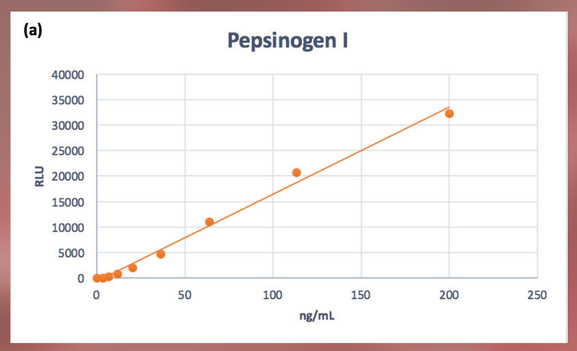
- Enzyme-linked immunosorbent assays (ELISAs) have been developed for the single detection of PGI, PGII and G17 in serum and plasma (Biohit Oyj, Helsinki, Finland). Applying ELISA principles, Biochip Array Technology (BAT) allows the multiplex determination of analytes from a single sample. Therefore this collaborative study aimed to develop a biochip array for the simultaneous detection of PGI, PGII and G17 in serum/plasma in order to provide a patient profile to facilitate the non-invasive screening and diagnosis on the condition of stomach mucosa.

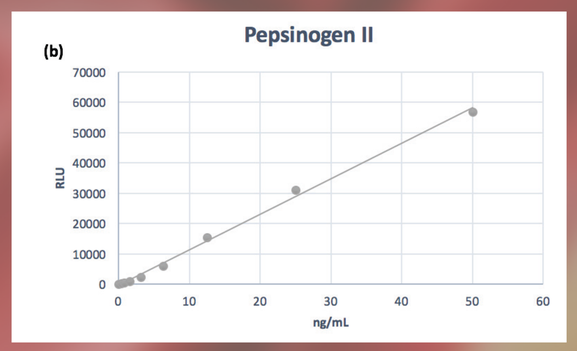
METHODOLOGY

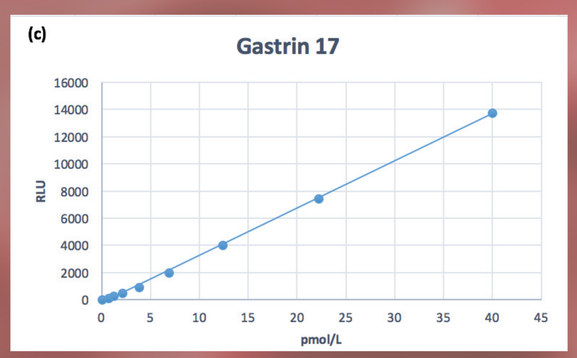
Simultaneous chemiluminescent sandwich immunoassays were employed, the anti-human capture antibodies were immobilised on the biochip surface defining discrete test sites. The immunoassays were applied to the Evidence Investigator analyser (Randox Laboratories Ltd., Crumlin, UK).
The multi-analyte calibrators were developed using native human antigen. A correlation study was carried out on a cohort of 76 serum/plasma samples using this biochip array and individual ELISAs (Biohit Oyj, Helsinki, Finland).

Typical calibration curves

Nine-point calibration curves for each individual analyte were simultaneously generated. The assay ranges were 0-200ng/mL for PGI, 0-50ng/mL for PGII and 0-40pmol/L for G17.







14.188.103RDRT

RLUs=Relative Light Units

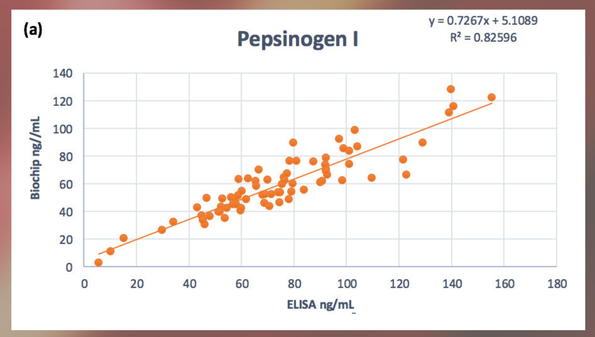
RESULTS

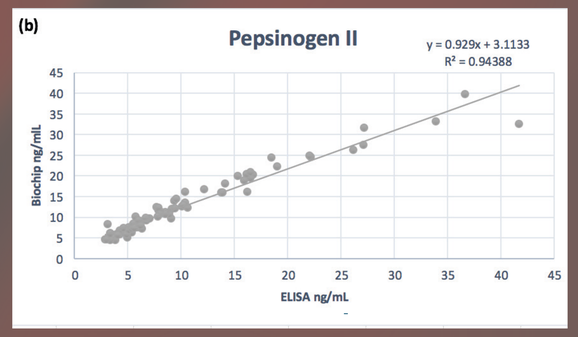
Specificity

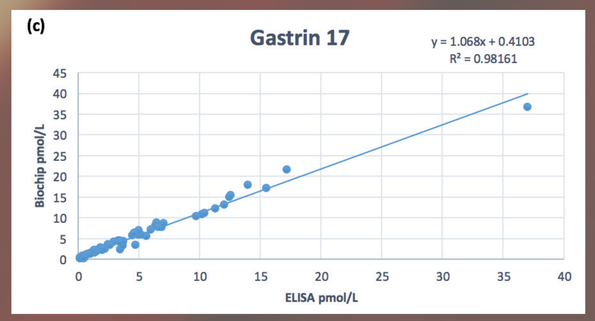
Cross-reactivity testing demonstrated that each individual assay was specific for its target analyte (<1% cross-reactivity with the other analytes).

Sample Analysis

76 serum/plasma samples were tested using BAT and individual ELISAs, the regression analysis showed the following values for the coefficient of determination (r^2) and slope:







15.437, 438, 445, 446.103RDRT

CONCLUSION

- The results of this collaborative study indicate applicability of BAT to the simultaneous measurement of PGI, PGII and G17 from a single serum/plasma sample.
- The use of this biochip array facilitates the screening and diagnosis of patients at risk of developing gastric cancer and offers advantages over current diagnostic methods such as gastroscopy, which can be highly invasive and costly.
- Good agreement was found between this technology and individual ELISAs.
- This newly developed array uses low sample volume and will offer a cost effective and efficient method of testing for patients.