STATE OF ART DIAGNOSIS OF *HELICOBACTER PYLORI* AND ITS CLINICAL SEQUELS

GastroPanel® - the most comprehensive test for *Helicobacter pylori*

It is possible to diagnose the two key risk factors of gastric cancer (GC) – ***Helicobacter pylori*** (HP) infection and **atrophic gastritis** (AG) - by using serological testing with a panel of biomarkers (GastroPanel®, Biohit Oyj, Finland): pepsinogen I (PGI), pepsinogen II (PGII), gastrin-17 (G-17) and HP-antibodies (1). GastroPanel® is the first non-invasive diagnostic tool for i) dyspeptic symptoms and for ii) screening of asymptomatic subjects for the risks of GC, but at the same time, iii) **the most comprehensive test for HP infection** (2).

GastroPanel® test is based on stomach physiology. Pepsinogen levels and their ratio is decreased in **corpus atrophy** (AGC), accompanied by elevated G-17b (basal). G-17b level also sensitively responds to gastric acid output, being low with high acid output and high when the stomach is acid-free (due to PPI or AGC). In **antrum atrophy** (AGA), G-17b is low and, importantly, does not respond to a protein stimulation (G-17s)(3,4,5). The test results are interpreted by a special software (GastroSoft®), identifying 8 marker profiles: 4 represent functional disorders, 3 specify structural abnormalities, the remaining being typical to HP-infection, with 3 possible outcomes: a) active HP-infection, b) successful eradication, and c) failed eradication (3,4,5).

GastroPanel® test has been validated globally in both clinical and screening settings. The literature was subjected to systematic review and meta-analysis, including 27 eligible studies and almost 9.000 patients (6). This meta-analysis corroborates the statement of 16 international experts, who advocate the use of this non-invasive serological test in diagnosis of dyspeptic symptoms and in screening of the GC risks among asymptomatic subjects (2). Symptomatic HP-infection, AG, or complicated high acid output detected by GastroPanel are indications of gastroscopy. GastroPanel can save up to 80% of unnecessary gastroscopies, liberating restricted endoscopy capacity for colonoscopy, which is indicated always when fecal occult blood is detected by ColonView-FIT (13).

GastroPanel - a cost-effective means in diagnosis and screening

To enable calculating the remarkable cost savings obtained by replacing the current diagnostic practice by systematic GastroPanel testing, two health economical modes were designed, both being easy to tailor for different settings: 1) **GastroPanel Screening Model** is a hybrid cost-efficiency/ budget impact model for GastroPanel screening, and 2) **Municipality Model** being a budget impact model in which GastroPanel is used for diagnosis purposes, replacing a part of current gastroscopies (7).

Conventional HP tests have serious limitations

The conventional tests used in diagnosing HP are extensively documented in the literature, confirming that certain clinical conditions seriously hamper the diagnostic value of the two most commonly used HP tests: ^{13}C-Urea Breath Test (UBT) and Stool Antigen test (SAT)(8,9). **False-negative** results are due to decreased bacterial loads in the stomach mucosa, and include the following clinical conditions: 1) use of PPI medication; 2) use of antibiotics; 3) bleeding peptic ulcer; 4) atrophic gastritis (AG; with or without intestinal metaplasia); 5) gastric cancer; 6) MALT lymphoma, and 7) partial gastrectomy (8,9). Similarly, UBT also gives **false-positive** results in cases where urease-producing bacterial species are colonizing an acid-free stomach due to AG or a long-term use of proton pump inhibitors (PPI)(8,9). Another important limitation of UBT and SAT is their failure of diagnosing AG (8,9), thus missing the patients at high risk for: i) gastric cancer (GC), ii) esophageal cancer, iii) vitamin-B12 deficiency, and iv) malabsorption of calcium, iron, magnesium and certain medicines (10,11,12).

Conclusion: Given that *Helicobacter pylori* is the single most important risk factor of gastric cancer, it is time to move a step forward also in the diagnosis of HP infections, and start using GastroPanel® that is i) free from the shortcoming of the conventional HP tests, and ii) provides an added value by detecting also the other key risk factor of GC, - atrophic gastritis (AG), caused by HP infection or autoimmune disease, with several above mentioned risks. The highly informative, patient-safe and cost-effective two Finnish innovations (GastroPanel® and ColonView®) should be included among the first-line diagnostic tools of all subjects suffering from abdominal symptoms (not infrequently of large intestinal origin), as well as for screening of gastric and colorectal cancer (1,13).

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