

endoFaster

real time gastric juice analysis



a new approach to gastroscopy

10/24/2017
YKE005-6





endofaster is a Class IIa medical device
EC Certificate No. G1 10 08 72288 001



ISO 9001
ISO 13485

Made in Italy by

NISO Biomed s.r.l. - www.endofaster.com

an entirely new perception

Integrate vision with the new sense of chemical analysis. Perform gastroscopy with a totally new approach: focus on patients at risk, get additional useful information that will lead you to unexpected deductions and solve problems right away with instant reports.

Context

Several diseases of the upper gastrointestinal tract, including *Helicobacter pylori*, do not cause alterations that can be macroscopically detected by a purely visual examination (such as endoscopy). Moreover, their focal distribution ("in patches") prevents even several bioptic samples from forestalling diagnostic omissions.

For this reason and considering their strategic importance in terms of prevention, consolidated international indications (e.g. Sydney System) suggest:

- performing bioptic samples "on all patients" (even when they present a normal endoscopic picture);
- collecting an adequate number of bioptic fragments (from 6 to 8 biopsies);
- collecting samples from various (not just one) stomach areas (antrum, angulus and fundus).

endofaster: functional features

endofaster analyses gastric juice and provides real time information to the endoscopist, thus potentiating and integrating the gastroscopic investigation with a comparison of visual observation and chemical tests.

The combination of this information and visual inspection improves diagnostic capacity and bioptic sampling strategy.

endofaster is connected between the endoscope and the suction system of the hospital. Therefore it makes use of normally suctioned gastric juice that is eliminated during endoscopy.

In particular, endofaster provides:

1. **diagnosis of *Helicobacter pylori*** through urease test on gastric juice
2. test of gastric pH and detection of hypochlorhydric conditions and correlation with **neoplastic risk conditions**
3. control of **effectiveness of PPI therapies** for gastroesophageal reflux disease

Clinical trials and scientific evidence

Extensive clinical trials and related international publications have proven the effectiveness and the high accuracy of the functionalities of endofaster and the analytical parameter tested by the device.

The full list of scientific papers reporting the results of the trials is available: ref. doc. YKE007.

The following table (Tab.1) summarize the series of trials conducted on different targets; the code of the main publications is indicated for each trial.

Table 1 – *List of clinical trials conducted and related publications.*

new approach to gastroscopy

#	Type of Trial	# patients	# hospitals	target	keyword	Ref. Papers	Ref. Authors
1	Retrospective (without EF)	17907	10	HP + AGOM + CANCER (gastric adenocarcinoma)	HP AGOM	DKE005 / Gastrointestinal Endoscopy (2007)	Rugge, Caletti, Fusaroli
2	Perspective preliminar (with EF)	73	1	HP + AGOM	HP AGOM	DKE006 / Digestion (2005) DKE007 / Endoscopy (2005)	Rugge, Caletti, Fusaroli
3	Validation of the previous trial (with EF) (same hospital)	143	1	HP + AGOM	HP AGOM	DKE005 / Gastrointestinal Endoscopy (2007)	Rugge, Caletti, Fusaroli
4	Perspective (with EF) - confirming the previous trials (multicentric, different hospitals)	189	2	HP	HP	DKE014 / United EU Gastroent Journ.	Costamagna, Hassan, Repici
5	Perspective (with EF)	33	1	HP under PPI therapy	HP	YKE015 / Fismad 2015 poster poster UEGW Eskena 2015	Grassini, Battaglia, Di Franco
6	Perspective (with EF)	216	1	pH / neoplastic risk conditions	pH risk factors	YKE006 poster UEGW 2010 DKE004 / Minerva Gastroent. Dietol. (2013) DKE011 / Dig. Liver Dis. (2014) DKE013 / Minerva Gastroent. Dietol. (2015)	Rugge, Andriulli, Tucci
7	Perspective (with EF)	147	1	pH / PPI effectiveness / GERD	pH GERD	DKE010 / British Society of Gastroent. Poster	Di Pietro, Bornschein, Cayado- Lopez

➤ Trials on HP and AGOM: findings

A first set of trials (#1, #2, #3) has been conducted to verify the accuracy of H. Pylori diagnosis (HP) and the correlation between gastric pH and atrophic gastritis (AGOM). This set includes:

- a **multicentre** retrospective analysis over **10 hospitals** and **17,907 patients** aimed at verify the accuracy of standard routine for diagnosis of HP, GAMO and gastric adenocarcinoma;
- a **perspective** trial on **73 patients** where endofaster indications has been compared to a large set of histologies + further exams for cross control
- a second confirmation group of **143 patients** has been considered to confirm the diagnostic thresholds defined by the first set of patients.

RESULTS - These trials showed mainly that:

- ✓ routine practice with low % of biopsies (57%) leads to poor accuracy (see tab.2 with comparison routine vs good practice 5 histologies and vs EGDS+endofaster).
- ✓ H. Pylori diagnosis on gastric juice with endofaster has high accuracy (see Tab 3.);
- ✓ AGOM is much better individuated by endofaster that the good practice (see Tab. 2 Control= 12,5%; endofaster = 12%; good practice=4,6%; and see Tab.4)
- ✓ Diagnosis with endofaster not only increases the accuracy but also requires less biopsies (just 36% adding the biopsies suggested by endofaster + biopsies targeting lesions detected optically).

Table 2 - Comparison of 3 clinical trials conducted + Check of actual presence of diseases.

	1. Routine practice (*)	2. Best practice EGDS + 5 biopsies mapping in 100% patients (**)	3. EGDS + gastric juice analysis with ENDOFASTER (**)	Check (actual presence of diseases)
<i>H. pylori</i>	20.1%	47.2%	48.2%	49.1%
GAMO	0.8%	4.6%	12.0%	12.5%
Gastric cancer	0.8%	0.8%	0.8%	0.8%
	↓	↓	↓	
N° biopsies + Histological analysis	57%	100%	36%	

(*) multicentre study – 10 hospitals – 17,907 patients

(**) single-centre study – 216 patients

Table 3 - endofaster accuracy for *Helicobacter pylori* infection and comparison with other tests

	ENDOFASTER	IgG	Urease test	UBT	Histology
Sensitivity	98%	84%	79%	90%	93%
Specificity	94%	89%	98%	94%	81%

Table 4 – EGDS+endofaster Accuracy for Atrophic gastritis of oxyntic mucosa and comparison with other tests

	ENDOFASTER	Gastrinemia	APA	AFI	B12	Histology
Sensitivity	96%	41%	33%	4%	22%	38%
Specificity	86%	98%	95%	100%	99%	98%

➤ Further trials on HP: findings

A further trial (#4) has been conducted by two KOL centre to verify the accuracy of H.Pylori:

- Prof. **Guido Costamagna** – Policlinico Gemelli – Rome
- Dr. **Alessandro Repici** – Humanitas - Milan

The protocol has been designed also by Dr. **C. Hassan** compared the diagnostic performance of endofaster with the performance of a mapping of 6 histologies and with the control of UBT (Urea Breath Test).

This trial confirmed the **high accuracy of the device** with sensitivity 97% and specificity 90%.

A preliminary **trial (#5)** showed that **endofaster diagnosis of HP is not affected by the assumption of PPI therapy** (proton pump inhibitor to control the acidity). The trial has been conducted on a cohort of patient under PPI therapy and confirmed a high sensitivity of endofaster for H. pylori infection at 91.3%.

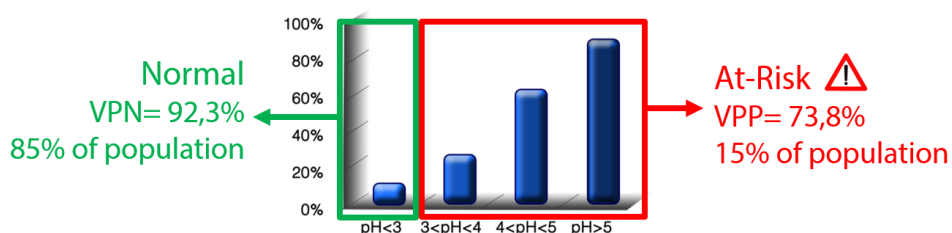
➤ Trials on neoplastic risk factors: findings

A further trial (#4) has been conducted by two KOL centre to verify the accuracy

The scientific works led by the famous pathologist Prof. Massimo Rugge carried on with endofaster revealed that **hypochlorhydria conditions** (detected by endofaster in real time during EGDS by gastric pH analysis) **are strongly correlated with neoplastic risk conditions.**

The following 8 parameters evaluated were: glandular atrophy and intestinal metaplasia (IM) of the antral and oxyntic mucosa; endocrine cells hyperplasia (G, ECL, antral non-G); hypergastrinemia.

The **pH was strongly correlated** ($r=0.67$ $p<0.01$) with the presence of the pathological conditions considered; the percentage of patients with one or more of these conditions increased as pH increased. According to the criterion of hypochlorhydria ($pH\geq 4$ or no gastric juice) utilized by endofaster, one or more pathological conditions were present in 83% of patients with hypo-achlorhydria and in only 9% of those normochlorhydric ($p<0.01$).



At the level of routine application these findings have demonstrated the use of gastric pH as indicator of at-risk / low risk conditions.

Having this indication at the beginning of the stomach observation during EGDS the endoscopist can optimize the observation and the biopsy sampling strategy:

if the patient is individuated in **“at-risk” condition** is strongly suggested to perform a complete mapping of histologies (6 biopsies as the international guidelines as Sydney System require: 2 in the antrum + 2 in corpus-fund + 2 in angulus);

In the other case, **“low-risk”**, if the endoscopist do not have other indications to take biopsies (as lesions optically detected or familiarity to stomach cancer, ...) he is supported by a high **NPV Negative Predictive Value 92.3%** to decide to avoid to sample biopsies (and consequently avoiding bleeding and reducing time and invasivity).

Further analysis has been conducted and published (see ref. DKE011 and DKE013) compared different diagnostic strategies and showed mainly:

- The use of endofaster gastric juice analysis during EGDS revealed 20% more lesions (IM or AG) **targeting a 4-biopsies mapping on the right patients** (just 15% of the total cohort of patients individuated as at-risk) compared to a EGDS procedure with a systematic strategy of 2 biopsies on 100% of the patients.
- The indication of the patient as “at-risk” (hypochlorhydria condition) was **strongly correlated with endocrine cells hyperplasia** (92% of the patients affected was hypochlorhydric), confirmed by immunohistochemistry analysis and thus showing high capacity of detecting and targeting the right patient on which to concentrate deep observations and analysis.

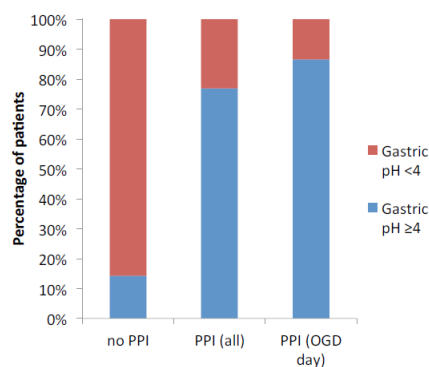
The possibility to target and optimize the biopsy sampling leads to important cost saving for the hospital and the national health system.

➤ Trial on Gastroesophageal Reflux Disease

For the segment of the patients affected by gastroesophageal reflux disease (GERD) the Addensbrooke’s Hospital in Cambridge (the most important centre for GERD in UK) realized an important trial: they used endofaster to test the gastric acidity and consequently to control the effectiveness of PPI drugs (Proton Pump Inhibitor) that must reduce the acidity of the stomach in order to avoid lesion of the esophagus caused by reflux.

The trial on 147 patients showed that up to **23.1% of the patients had an acid gastric juice revealing ineffective control of pH by PPI therapy.**

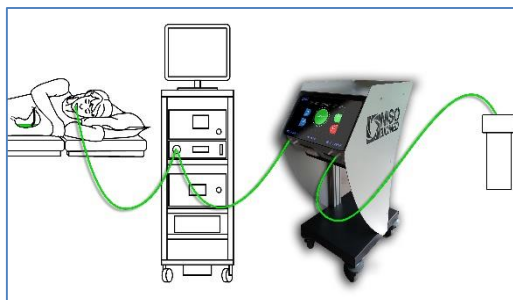
Consequently, the real time control during EGDS by endofaster allow the endoscopist to increase or **optimize the therapy** for the patients individuated and reduce dramatically the risk for esophagus diseases and tumor (Barrett’s esophagus).



How to use

endofaster is installed through the endoscope and the aspiration system: the plastic tube providing the aspiration is connected to endofaster (instead to directly connect it to the scope) and an other tube from endofaster will provide the aspiration to the scope.

Without any change in the normal procedure, the nurse staff will just take the tube from endofaster (as if endofaster was integrated to the aspiration system).



At the beginning of the gastroscopic exam, as soon as the endoscopist reach the stomach, in **few seconds** a very small sample of gastric juice (**2 ml**) is aspirated by the scope and it is taken by endofaster. The analysis of the gastric juice is immediately performed by endofaster providing:

- A. In 15 sec : Alert for preneoplastic risk conditions
→ the endoscopist optimizes the sampling of biopsies
- B. In 60 sec : Diagnosis of H. Pylori
- C. In 15 sec : (GERD patients) control of effectiveness of PPI therapies

Cost-savings

Calculations have revealed that the cost-saving effect of the remarkable reduction in bioptic sampling and histological analyses equals or exceeds the cost of the endofaster service.

The **Italian Ministry of Health** has selected endofaster and has conducted a 1-year analysis of the cost savings generated by the use of the device applying a HTA – Health Technology Assessment methodology.

On the 31st of July 2015 the Ministry of Health has published the result of the **Health Technology Assessment**:

90,000 € annual cost **saving** generated using endofaster for a small-medium size center (2,000 OGD/year)

BENEFITS

BETTER DIAGNOSIS

- **Increased accuracy**; fewer false negative tests
- Detection of pathological **conditions that would otherwise pass unnoticed**
- Diagnostics for **patients who cannot undergo a biopsy** (patients with coagulopathies or under treatment with anticoagulants)
- **Regardless of sampling site**
- Quantitative result for the H.Pylori infection
- Additional information will lead you to unexpected deductions

SUPPORTS DIAGNOSIS

- endofaster gives printed **report** containing H. Pylori diagnosis and neoplastic risk factors alert, legally supporting the decisions taken by the endoscopist

EASY, STREAMLINED OPERATIONS

- **Automatic** test conducted in **real time with response** both during endoscopy and to underpin the investigation
- **Easy** – it requires no operator intervention
- **Time-saving** for both the endoscopist and nurses during gastroscopy; saves time spent on tests and their management after gastroscopy
 - Avoids the urease test on biopsies (100%)
 - Avoids histologies (20-80%)

COST SAVING

- Simplified, **streamlined management** slashes the cost
- **Immediate report** delivered to the patient
- **Fewer biopsies** and associated histologies
- Increased diagnostic accuracy leads to a **reduction of further exams**

FOR THE PATIENT

- **Better diagnoses**
- **Less invasive**: shorter test + no/fewer biopsies
- **Immediate** reports (without having to return to collect reports from the hospital or GP)
- **PPI independent** (no need to stop therapy)
- HP diagnosis for **patients who cannot undergo a biopsy** (under anticoagulants, cirrhotic, ...)