

Biocard® Celiac-test: a simple and reliable screening test for celiac disease

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Background:

Celiac disease (CD) is an immune-mediated enteropathy triggered by the ingestion of gluten, which affects genetically predisposed individuals(1). CD is one of the most common lifelong disorders in Europe with an estimated prevalence between 0.3% (Germany) and 2.4% (Finland), and 0.75% for Switzerland (2, 3). Gastrointestinal symptoms vary from mild to severe but can also be absent despite the presence of mucosal lesions. Patients may be clinically silent for a long time or only present extra-intestinal manifestations, such as osteoporosis, dental enamel defects, and other atypical symptoms of other organ systems(4). Therefore, serologic screening with reliable tests is essential in the diagnostic approach of this variable disease.

Small intestinal biopsies remain the gold standard for diagnosis of CD, showing villous atrophy, crypt hyperplasia and intraepithelial lymphocytosis. However, standard serological testing including total serum IgA and IgA class tissue transglutaminase (TTG) antibody enzyme-linked immunosorbent assay (ELISA) test has proved to be a sensitive tool for CD detection (9), even in atypical or silent cases (5-8). Decreased total IgA do not permit interpretation of standard serological test and patients with negative anti-TTG IgA require small intestinal biopsies

We conducted a prospective analysis of children undergoing an upper endoscopy for suspected CD comparing standard serum anti-TTG-IgA with a newly developed capillary rapid test measuring total IgA and serum anti-TTG IgA (Biocard® Celiac-test).

Patients and method:

Sixty-eight patients (51 girls; mean age 6.8 years, range 10 months – 16.4 years) with suspicion of CD (positive standard serological test) and/or decreased total IgA underwent upper endoscopy and Biocard[®] Celiac-test.

Results:

Among the 68 subjects, 13 (19.1 %) had decreased total serum IgA and 5 (7.3%) had increased anti-TTG IgA despite decreased total IgA. Small intestinal biopsies from 39 patients (57.4%) showed villous atrophy and/or intraepithelial lymphocytosis, confirming CD. All of them (100%) had increased standard serological test and 33 (84.6%) had positive Biocard[®] Celiac-test. Biopsies were normal in 27 patients (39.7 %). Fourteen of them (51.2 %) had increased standard serological test and 13 (48.1%) had decreased total serum IgA. One (3.4 %) had a positive Biocard[®] Celiac-test. Compared to the classic test, the Biocard showed a higher AUC (chi-square=7.07, p=0.008), a higher accuracy (McNemar test=19.0, p<0.001) and also a higher Kappa level (**Table 1**).

Conclusion:

Biocard[®] Celiac-test is more reliable than standard serological test to diagnose CD, with better specificity and positive predictive value. It appears to be a simple, rapid and cheap screening test for CD in order to determine if small intestinal biopsies are required. It can easily be performed by pediatricians and general practitioners in private practice with a very small amount of capillary blood.

Small intestinal biopsies remain the gold standard for diagnosis of CD in atypic and silent cases. In patients with typical symptoms and anti-TTG IgA levels > 10 times the upper limit of normal, several authors postulate that those patients may not need confirmation of CD by upper endoscopy. Positive Biocard[®] Celiac-test should lead to standard serological testing in order to quantify IgA-tTG and the need for small intestinal biopsies.

Table 1:

Classic serological test and Biocard[®] Celiac-test compared to small intestinal biopsies

	Sensitivity	Specificity	PPV	NPV	AUC	Accuracy	Kappa
Classic test	100* (91.0 – 100)	51.7 (32.5 – 70.6)	73.6 (59.7 – 84.7)	100* (81.5 – 100)	75.9 (66.6 – 85.1)	79.4 (67.9 – 88.3)	0.551 ***
Biocard	84.6 (69.5 – 94.1)	96.6 (82.2 – 99.9)	97.1 (84.7 – 99.9)	82.4 (65.5 – 93.8)	90.6 (83.9 – 97.2)	89.7 (79.9 – 95.8)	0.794 ***

Results are expressed as percentage and (95% confidence interval), except for Kappa values. PPV: positive predictive value; NPV: negative predictive value; AUC: area under the ROC. ***: $p < 0.001$.

*Sensitivity and negative predictive value of standard serological test might be biased as positive standard serology and/or low IgA levels was the prerequisite for performing small intestinal biopsies

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