

## Fecal Calprotectin Testing in the Primary Care Setting

Fecal calprotectin (FC) is a protein released by neutrophils, and measurement of FC via an ELISA test is used to test for gastrointestinal inflammation, as increased FC levels are associated with disorders such as inflammatory bowel disease (IBD). Gastroenterologists routinely use this test, but utilization of FC testing by primary care physicians for determining a diagnosis in children is unknown.

This retrospective study occurred at an integrated health care system, and all FC tests performed in patients 18 years or younger over a 5-year period were collected. All diagnoses for these patients were reviewed, and serum albumin and C-reactive protein (CRP) levels obtained within one month of FC testing also were reviewed. Patients were followed to see if they developed IBD within 12 months of FC testing. Additionally, patients who had elevated FC levels and did not have a diagnosis of IBD were evaluated to see if they had repeat FC testing within 12 months.

A total of 898 patients had FC testing during the study period. Abdominal pain was the main indication for FC testing. Patients with a known diagnosis of IBD or with follow up less than one year were excluded. It was determined that 84% of the remaining patients (689 of 822 patients) had normal

FC levels with 96% of these patients not receiving a diagnosis of IBD. Patients with normal FC levels that went on to have endoscopy consisted only of 14 patients and had a final diagnosis of a variety of conditions, including eosinophilic esophagitis, celiac disease, colon polyp, *Helicobacter pylori* infection, and normal endoscopy. A subgroup consisting of 133 of the 822 patients had elevated FC levels, and 42 of these patients had a subsequent IBD diagnosis confirmed by endoscopy with biopsy. Other diseases associated with elevated FC levels included *Clostridium difficile* infection, *Escherichia coli* infection, *Salmonella* infection, *H. pylori* infection, celiac disease, cystic fibrosis, milk protein sensitivity, Henoch-Schonlein purpura, and colon polyps. Of note, 29% (39) of the 133 patients with elevated FC levels had repeat FC testing performed in the next 12 months, and FC levels normalized in all 39 patients.

Median FC levels were significantly higher in patients with IBD compared to patients without IBD (1084 microgram/gram vs 27.05 microgram/gram,  $P \leq 0.001$ ). Additionally, the mean age at the time of FC testing was higher in patients with IBD compared to patients without IBD (13.6 years vs 11 years,  $P = 0.001$ ). FC was associated with markedly improved sensitivity compared to serum CRP and albumin levels for diagnosing IBD while specificity and negative predictive value were approximately the same for all three tests. Serum albumin had better positive predictive power for diagnosing IBD compared to FC.

This study demonstrates that FC testing in the primary care setting has the potential to screen for and potentially lead to an earlier diagnosis of IBD. Several non-IBD diagnoses, such as infectious colitis, correlated with high FC values suggesting that other standard laboratory tests (such as stool culture testing) could be more effective in specific patients. Additionally, there is a variation in testing costs for FC across the United States, which may limit FC testing.

Ramraj R, Garcia A, Mosen D, Waiwaiole L, Smith N. Utility of fecal calprotectin in evaluation of chronic gastrointestinal symptoms in primary care. *Clinical Pediatrics* 2018; 57: 1058-1063.

### Answers to this month's crossword puzzle:

1	P	A	N	C	R	E	A	T	5	I	C	6	C	7	Y	8	S	9	T
	E		E		A		I			N	10	S	11	E	T	C			
12	C	H	O	R	D	A	L		13	F	E	C	A	L					E
	T		P		I					L		R		L		L			
14	O	I	L		15	O	P	16	E	R	A	T	E		17	O	W	L	
	S		A		L		E			M		E			W				
	E		18	S	T	O	O	L		19	E	I	N	E		20	M	21	D
			T		G					D					22	H		I	
23	24	P	I	C	Y			25	B	P		26	U	L	C	E	R	S	
27	T	I	C							I		28	G				R		
29	A	T		30	D	31	I	E	T	A	R	Y	32	F	I	B	E	33	R
	I		34	H	O	T				T	O		E						A
35	N	E	A	T			36	H	E	M	O	S	T	A	37	S	I	S	
	E		L			38	C		R		V		I		U				H
39	R	E	F	L	U	X			40	F	E	E	D	I	N	G			

## Esophageal Atresia: Does Fundoplication Work?

Esophageal atresia (EA) is associated with significant morbidity in children, and fundoplication often is performed in patients with EA when complications from gastroesophageal reflux disease (GERD) cannot be controlled with medical management. However, it is unclear if the pathophysiology of EA affects the efficacy of a fundoplication. The authors of this study identified all pediatric patients with EA who had undergone fundoplication and compared this group with all other patient types who had undergone fundoplication at a tertiary children's hospital in Australia over a 20-year period (1994-2013). Patient demographics, including EA subtype, neurologic impairment, gastrostomy placement, tracheomalacia, and type of fundoplication surgery (open or laparoscopic) were recorded. Redo of a fundoplication was considered a fundoplication failure.

The retrospective database identified 85 patients with fundoplication and EA and 682 patients with fundoplication and no associated EA. The majority of patients with EA had a subtype of EA with distal TEF. The use of primary fundoplication declined over the study period in both groups with 37% less procedures occurring between 2010 – 2013 compared to 1994 – 1997. The use of laparoscopic fundoplication increased in both groups over time (3.5% annual increase in the patients with EA group; 4.5% annual increase in the control group). The total number of laparoscopic procedures was significantly lower in patients with EA (21%) compared to the control group (52%), and the median age at time of primary fundoplication was significantly lower in the patients with EA group (7.2 months) compared to the control group (23.3 months).

Repeat fundoplication was not significantly different between groups (13% of patients with EA versus 8% of the control group), and there was no difference in the percentage of repeat fundoplication when patients with EA were compared to children with neurologic disease. The rate of repeat fundoplication did not change over time between groups although patients with EA had a significantly longer period between primary and repeat fundoplication (36.2 months versus 11.7

months). EA subtype was not associated with an increased risk of repeat fundoplication although children with EA and a primary fundoplication under 2 years of age had a significantly increased risk of repeat fundoplication compared to children with EA who underwent a primary fundoplication when they were older.

This study suggests that fundoplication in children with EA is just as successful as patients who undergo fundoplication for other medical reasons although children with EA who undergo a primary fundoplication at a younger age may have an increased risk of needing a repeat procedure.

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Pellegrino S, King S, McLeod E, Hawley A, Brooks J, Hutson J, Teague W. Impact of esophageal atresia on the success of fundoplication for gastroesophageal reflux. *Journal of Pediatrics* 2018; 198; 60-66.

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John Pohl, M.D., Book Editor, is on the Editorial Board of *Practical Gastroenterology*

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