

## Supplemental Materials

### Supplemental methods

We performed a case-control study using data from the University of North Carolina (UNC) Diverticulosis Study. The UNC Diverticulosis Study was a colonoscopy-based study (NIH R01DK094738) designed to study risk factors for diverticulosis. The study included 616 patients 30 years or older who had a screening colonoscopy at UNC Chapel Hill between 2013-2015. Inclusion criteria included patients with a complete examination to the cecum and satisfactory preparation sufficient for screening. Exclusion criteria included: 1) prior colonoscopy, 2) indication other than screening, 3) familial polyposis syndrome defined as greater than 100 polyps or FAP gene test positive, 4) evidence of colitis, either ulcerative, Crohn's, radiation, or infectious colitis, 5) previous colonic resection based on history and colonoscopy, or 6) previous colon cancer or adenomas.

Patients were interviewed prior to colonoscopy over the phone with the use of a computer-assisted telephone interview. The questionnaire included questions about dietary and lifestyle exposures in addition to alcohol and tobacco use. Sex and age were collected from the medical record and dietary information was collected using a food frequency questionnaire developed by the National Cancer Institute.<sup>5</sup> Participants were asked about their dietary consumption in the the year prior to colonoscopy. Physical activity was measuring with the International Physical Activity Questionnaire<sup>6</sup> and IBS was defined by Rome III criteria.<sup>7</sup>

Board-certified attending gastroenterologists performed all colonoscopies. Colonoscopies were complete to the cecum with at least a satisfactory preparation as determined by the endoscopist. Per protocol, each endoscopist was directed to deliberately examine the colon for diverticulosis and hemorrhoids while a research assistant was present during the entire procedure transcribing the data to a standard data collection sheet. The number, location, size, and depth of diverticula were noted. Upon retroflexion in the rectum, internal hemorrhoids were noted as not present or present. If internal hemorrhoids were present, they were graded as small, medium, or large.

Means and standard deviations were calculated for continuous variables and proportions for categorical data. The following baseline variables were assessed as potential confounders in the models: age, sex, race, body mass index, education, smoking, dietary fiber intake in quartiles, history of hypertension, history of

diabetes, calorie consumption, physical activity, laxative use, bowel movements frequency and consistency. The 10% change-in estimate approach was used to identify confounding variables with age, sex, and dietary fiber intake included in the final models. Multivariate analysis was performed with logistic regression to estimate odds ratios and 95% confidence intervals. A Cochran-Mantel-Haenszel test was performed for a stratified analysis to test for heterogeneity of association. The analysis was performed using SAS 9.4 (SAS, Cary, North Carolina).

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**Supplemental Table 1. Baseline Characteristics**

Characteristic, % or mean $\pm$ SD	No hemorrhoids (n=261)	Hemorrhoids (n= 355)
<b>Age, years</b>	53 $\pm$ 7	55 $\pm$ 7
<b>Sex</b>		
Male	41	45
Female	59	54
<b>Race</b>		
White	77	74
Black	19	21
Asian	2	2
<b>Education</b>		
< 12 years	5	5
12 years	7	9
Some college	27	20
College graduate	62	65
<b>BMI, kg/m<sup>2</sup></b>	29 $\pm$ 6	29 $\pm$ 8
<b>Smoking status</b>		
Current	12	13
Former	28	30
Never	60	56
<b>ASA use, per month</b>		
Never	58	58
1-4x/month	34	35
>5x/month	8	7
<b>NSAID use, use per month</b>		
Never	56%	56
1-4x/month	19%	24
>5x/month	25%	20
<b>History of diabetes</b>	9	13
<b>History of hypertension</b>	37	34
<b>Total energy intake, kcal/day</b>	2,038 $\pm$ 802	2,087 $\pm$ 805
Fiber, grams/day	20 $\pm$ 10	20 $\pm$ 10
Red meat, grams/day	1.4 $\pm$ 1.12	1.5 $\pm$ 1.19
Fat, grams/day	88 $\pm$ 39	86 $\pm$ 38
<b>Physical activity per week, METS</b>	3,491 $\pm$ 4,755	3,362 $\pm$ 4,098
<b>Bowel movements/week</b>	9 $\pm$ 6	8 $\pm$ 4
<b>Bristol stool score</b>		
Type 1-2	13	10
Type 3-5	78	84
Type 6-7	9	7
<b>Regular laxative use</b>	10	10

Abbreviations: SD, standard deviation; BMI, body mass index; NSAID, nonsteroidal anti-inflammatory drug; MET, metabolic equivalent task

**Supplemental Table 2. Colonic diverticulosis in categories by number and association with internal hemorrhoids on colonoscopy**

Diverticulosis	All cases (hemorrhoids)		Controls		Crude odds ratio	95% CI	Adjusted odds ratio <sup>1</sup>	95% CI
	(n=355)		(n=261)					
	No.	(%)	No.	(%)				
None	184	52	179	69	REF	--	REF	--
1-3	36	10	33	13	1.06	0.63- 4.77	0.83	0.36- 1.93
4-10	64	18	27	10	2.31	1.41- 3.78	2.56	1.32- 1.93
>10	73	21	22	8	3.23	1.92- 5.43	3.33	1.70- 6.55

<sup>1</sup>Adjusted for age, sex, dietary fiber consumption