

## Colonoscopy

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Several high-quality studies pertinent to colonoscopy were presented at Digestive Disease Week (DDW) 2014. The following review discusses studies that are considered to address some of the most burning questions in colonoscopy research: quality of colonoscopy and its measurement, surveillance intervals for adenomas, the treatment of diminutive adenomas, basic and advanced polypectomy techniques, and microbiome changes in relation to colonoscopy.

### COLONOSCOPY QUALITY MEASUREMENT

Professional societies have proposed the use of several quality measures for colonoscopy.<sup>1,2</sup> However, the continual assessment of quality measures is challenging because it requires complete data capture, the merging of colonoscopy and pathology reports, and manual categorization. Natural language processing is a computer technology that identifies and extracts information from free-text reports in an automated fashion, and is therefore potentially suitable for colonoscopy quality measurement.

At this year's DDW, Raju et al<sup>3</sup> reported on a cross-sectional study that compared natural language processing with manual reporting of colonoscopy performance at one academic institution in the United States. The natural language processing program extracted the data from three data sources: the electronic medical record, the colonoscopy report, and the pathology report, processing them to produce colonoscopy quality metrics. The data were considered to be accurate when both methods agreed, otherwise the medical record was studied further to establish the correct information. Of the 12/478 colonoscopies studied, 2088 were first-time screening examinations, and

*Abbreviations:* CRC, Colorectal cancers; DDW, Digestive Disease Week; PCR, polymerase chain reaction.

*DISCLOSURE:* All authors disclosed no financial relationships relevant to this article.

This report is published simultaneously in the journals *Gastrointestinal Endoscopy* and *Endoscopy*.

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0016-5107/\$36.00  
<http://dx.doi.org/10.1016/j.gie.2014.07.005>

the natural language processing, which required no more than an hour, accurately identified 98% of them compared with 86% identified by manual reporting ( $\geq 5$  min/record). Both methods nearly perfectly identified adenomas (99% and 98% for the natural language processing and manual reporting, respectively) and sessile serrated adenomas (100% and 96%, respectively). This study is in line with a recent report showing very high accuracy of natural language processing in categorizing data necessary for colonoscopy quality measurement.<sup>4</sup> One of the major drawbacks of natural language processing in daily practice is that it requires complete reporting of the data that are necessary for quality measurement. An alternative would be to use a structured colonoscopy reporting system, which forces endoscopists to report a minimum set of items, generates a free text reports, and provides automatic quality assessment.<sup>5</sup> The latter, however, requires manual entry of histopathology results.

In conclusion, this study provides evidence that natural language processing is a quick and accurate tool for colonoscopy quality measurement. Natural language processing combined with structured colonoscopy reporting systems may offer an optimal solution for continuous quality measurement.

### INTERVAL COLORECTAL CANCERS

Colorectal cancers (CRC) that occur before scheduled surveillance or between month 6 and 36 after a clearing colonoscopy are called interval cancers.<sup>6-8</sup> Population-based studies from the United States, Canada, and Europe have reported that interval cancers account for 3.4%–9.2% of all detected CRCs.<sup>6-8</sup>

At DDW 2014, Cheung et al<sup>9</sup> reported a nationwide analysis of the rates, risk factors, and time trends in the occurrence of interval CRCs in England between the years 2001 and 2012. The authors used data from the National Health Service to identify patients who were diagnosed with a CRC 6–36 months following a negative (no cancer diagnosis) colonoscopy. Of 2/263/905 patients who underwent colonoscopy, 136/237 were diagnosed with CRC, 12/485 of whom (9.2%) were diagnosed with interval CRC. In a multivariate analysis, interval CRCs were directly associated with older age, female sex, and co-morbidities and, unexpectedly, were inversely associated with proximal colon location.

Yet the most interesting observation arising from this study, is that the annual rate of interval CRC declined, from 15.9% to 5.1%, over the study period. Suboptimal quality of colonoscopy is considered to be the key and most modifiable risk factor for interval CRC.<sup>6-8</sup> Indeed, there has been considerable improvement in the quality of colonoscopy over the study period in the United Kingdom.<sup>10</sup> Therefore, it is likely that the observed fall in annual rates of interval CRC follows previously reported improvement in the quality of colonoscopy. Although we still need to close the gap between improvement in quality of colonoscopy and its effect on interval CRC rates, this study shows promise for the future.

## NATURAL HISTORY OF DIMINUTIVE ADENOMAS

In patients with one or two nonadvanced adenomas that are completely removed during a high-quality baseline colonoscopy, the European Society of Gastrointestinal Endoscopy recommends surveillance colonoscopy after 10 years.<sup>11</sup> In contrast, detection of three or more adenomas, regardless of their size or dysplasia grade, is an indication to repeat the colonoscopy after 3 years. The quality of evidence supporting these recommendations was judged to be moderate. New evidence presented by Otake et al<sup>12</sup> at DDW, came from a study that aimed to determine the incidence of advanced neoplasia in screenees with diminutive polyps that were judged to be adenomas on chromoendoscopy with magnification but were not removed at the index colonoscopy.

The authors retrospectively studied the 5-year cumulative incidence of advanced neoplasia in 2070 patients who had no adenomas and 705 patients who were optically diagnosed with adenomas of  $\leq 5$  mm that were not removed at screening colonoscopy. The cumulative incidence of advanced neoplasia was 1.7% (35/2070) in the group without adenomas and 2.8% (20/705) in the group with diminutive adenomas ( $P = 0.059$ ). Notably, the cumulative incidence of advanced neoplasia was significantly higher in patients with  $\geq 3$  adenomas at the index colonoscopy (10.8%;7/65) than in patients with 1–2 adenomas (2.0%;13/640,  $P$  value not given).

Two observations from this study are important for the timing of colonoscopy surveillance following adenoma removal. First, the 5-year risk of advanced neoplasia in patients with 1–2 untreated diminutive adenomas was comparably low, similar to that of patients without adenomas. Given that the adenomas should have been removed at index colonoscopy, this evidence strongly supports surveillance times being longer than 5 years in patients with 1–2 diminutive adenomas.

In patients with at least three untreated diminutive adenomas, the risk of advanced adenoma was five-fold higher

(10.7%) than in other groups, and this supports short-term surveillance as recommended by the guidelines.

In conclusion, the natural history of diminutive adenomas shows that 5-year risk of advanced neoplasia is low in patients with 1–2 adenomas but five-fold higher in patients with  $\geq 3$  adenomas.

## BASIC POLYPECTOMY TECHNIQUE

Incomplete polypectomy may significantly contribute to the development of interval CRCs.<sup>13</sup> Although available data indicate that most of these CRCs develop from incomplete resection of large adenomas,<sup>13</sup> it is believed that some arise from remnants of smaller lesions. In order to achieve complete removal, it is recommended to resect small polyps (6–9 mm in size) using a polypectomy snare and diminutive ones (1–5 mm in size) using a cold biopsy or a cold snaring technique.<sup>14</sup> Most experts suggest using cold biopsies only for polyps 1–3 mm in size and the cold snaring technique for polyps 4–6 mm or even 4–9 mm in size.<sup>15</sup>

At this year's DDW, two interesting studies regarding basic polypectomy technique were presented.<sup>16,17</sup> Britto-Arias et al<sup>16</sup> reported on a large cross-sectional analysis of polyp resection technique and associated completeness of adenoma removal during colonoscopy in the Austrian National Colorectal Cancer Screening Program. Database records of 115/356 colonoscopies, including 40/020 polypectomies, performed between November 2007 and July 2013 were studied. The authors found that, in defiance of recommendations, 46.4% of 15/128 polyps  $\geq 5$  mm in size were removed using biopsy forceps (52.7% when considering polyps 5–10 mm). The rate decreased over time by 17.8% in the hospitals, but increased by 7.5% in private practices, suggesting poor penetration of the existing guidelines in the community. Importantly, the inappropriate technique had significant consequences for the completeness of polyp removal. Of 18/387 adenomas with complete histopathological and resection details, incomplete resections occurred in 17.0% (95% confidence interval [CI] 15.41%–18.64%) of forceps and 6.2% (95%CI 5.37%–7.06%) of snare polypectomies. The relative risk (RR) of incomplete resection for forceps vs. snare polypectomy was 2.98 (95%CI 2.56–3.47) for adenomas  $\geq 5$  mm, whereas for adenomas  $< 5$  mm in size it was significant only for polypectomies performed in private practices (RR 1.68, 95%CI 1.42–2.00).

In the DDW plenary session, Kim et al<sup>17</sup> presented results of a single-center, randomized controlled trial comparing complete resection rates of cold snare polypectomy and hot snare polypectomy for 213 sessile and flat colorectal polyps 5–9 mm in size. The completeness of polyp resection was assessed by histological assessment of four-quadrant forceps biopsies taken from the edges of the polypectomy site. The complete resection rate was

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