Yield of Colonoscopy After a Positive Result From a Fecal Immunochemical Test OC-Light

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BACKGROUND & AIMS: **The fecal immunochemical test (FIT) is widely used in colorectal cancer (CRC) screening. The OC-Light FIT is 1 of 2 FITs recommended for CRC screening by the Preventive Services Task Force guidelines. However, little is known about its ability to detect CRC in large average-risk populations.**

METHODS: **We performed a retrospective cohort study of patients (50–75 years old) in the San Francisco Health Network who were screened for CRC by OC-Light FIT from August 2010 through June 2015. Patients with a positive result were referred for colonoscopy. We used electronic health records to identify participants with positive FIT results, and collected results from subsequent colonoscopies and pathology analyses. The FIT positive rate was calculated by dividing the number of positive FIT results by the total number of FIT tests completed. The primary outcome was the positive rate from OC-Light FIT and yield of neoplasms at colonoscopy. Secondary outcomes were findings from first vs subsequent rounds of testing, and how these varied by sex and race.**

RESULTS: **We collected result from 35,318 FITs, performed on 20,886 patients; 2930 patients (8.3%) had a positive result, and 1558 patients completed the follow-up colonoscopy. A positive result from the FIT identified patients with CRC with a positive predictive value of 3.0%, and patients with advanced adenoma with a positive predictive value of 20.8%. The FIT positive rate was higher during the first round of testing (9.4%) compared to subsequent rounds (7.4%) ($P < .01$). The yield of CRC in patients with a positive result from the first round of the FIT was 3.7%, and decreased to 1.8% for subsequent rounds ($P = .02$).**

CONCLUSIONS: **In a retrospective analysis of patients in a diverse safety-net population who underwent OC-Light FIT for CRC screening, we found that approximately 3% of patients with a positive result from a FIT to have CRC and approximately 21% to have advanced adenoma.**

Keywords: Early Detection; Colon Cancer; Prevention; Stool; Abnormal.

Colorectal cancer (CRC) is the second leading cause of cancer-related deaths and the third most common diagnosed cancer in the United States.[1] The incidence and mortality rates of CRC have declined over the last 3 decades corresponding to multiple factors including increases in CRC screening rates.[2,3] The US Preventive Services Task Force (USPSTF) recommends CRC screening between ages 50 and 75 in average-risk adults.[3] However, screening rates remain suboptimal, and it is estimated that further reductions in CRC incidence rates by 22% and mortality rates by 33% are possible if screening rates of 80% in the United States were achieved.[4] To capture the patients not up-to-date with CRC screening and to maintain high rates of CRC screening, organized population-based programs that include stool-based testing are needed.[5,6]

The USPSTF recommends the use of the fecal immunochemical test (FIT) as a stool-based test for CRC screening.[3] The Food and Drug Administration has

Abbreviations used in this paper: CRC, colorectal cancer; FIT, fecal immunochemical test; USPSTF, US Preventive Services Task Force.

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cleared the use of many FITs in the United States for use in CRC screening programs and granted the tests a waived status under the Clinical Laboratory Improvement Amendments.[7] However, performance characteristics of many Food and Drug Administration–cleared FIT have not been evaluated in large average-risk populations and the quality of their development and interpretation have not been validated. FIT detects the globin moiety of human hemoglobin in the stool.[8] OC-Light FIT (Polymedco, Inc, Cortlandt Manor, New York) is a qualitative test analyzed by immunoassay methods and differs from quantitative FIT.[9] Qualitative FIT can be developed and interpreted at point-of-care, which raises concern for consistency in sample application and visual interpretation. The positivity threshold of qualitative FIT (cutoff concentration for a test to be positive) is set by the manufacturer and cannot be adjusted by the end user. In contrast, quantitative FIT, which is also Food and Drug Administration–cleared to provide only qualitative results, requires laboratory-based calibration using standard curves. The positivity cutoff can be adjusted, which allows the end user to adjust the sensitivity and specificity of the test.[10] The development and interpretation is automated after calibration and offers high throughput of specimens.

FIT sensitivity for CRC is estimated to be 75%, but has varied between 25% and 100% across different types of FIT tests, whereas the specificity has varied between 83% and 99%.[11] There are limited data on the real-life application of many qualitative FIT brands available in the United States or their positivity rates in average-risk population. Specific to OC-Light FIT, heterogeneity has been reported in the real-life application of the test, although USPSTF recommended the use of OC-Light FIT. The yield of colonoscopy for CRC using the OC-Light FIT has varied between 1.7% and 10.8%.[12–16] Therefore, the aim of the study was to evaluate the positive rate of the OC-Light FIT and the yield of colonoscopy after a positive result from a FIT in a diverse average-risk patient population in a safety-net system.

Methods

Study Design and Population

We conducted a retrospective cohort study of patients ages 50–75 in the San Francisco Health Network who received CRC screening by FIT between August 2010 and June 2015. The study cohort and setting have been previously described.[17] In short, San Francisco Health Network is an integrated health care safety-net system that delivers health services to uninsured, Medicaid, and other vulnerable residents of San Francisco. It is an integrated safety-net system comprised of 12 adult community health centers, a centralized laboratory, and a multispecialty medical center, the Zuckerberg San Francisco General Hospital and Trauma Center.[17]

Screening With Fecal Immunochemical Test

FIT testing with the OC-Light FIT tests started to be used in 2010 and were fully adopted across the system by 2012 as the primary form of CRC screening for average-risk individuals. The OC-Light test was provided to patients at a point-of-care visit and patients returned the completed test by mail to a central Zuckerberg San Francisco General Hospital and Trauma Center clinical laboratory, where it was processed. The OC-Light FIT is a lateral flow chromatographic immunoassay using immobilized antibodies specific to human hemoglobin, which provides qualitative results in the form of a visible reddish/pink line at a cutoff of 10 μg hemoglobin/g stool.[7] This cutoff is lower than that of the OC-Sensor FIT (Polymedco, Inc) (20 μg hemoglobin/g stool), which is the only other FIT in the United States recommended by the USPSTF. As a result, the OC-Light FIT is likely to have higher positive rate and sensitivity, and lower specificity compared with the OC-Sensor FIT.

Data Sources and Collection

San Francisco Health Network is supported by E-Clinical Works (eCW) as its primary outpatient electronic health record platform, which is linked to other data sources, such as the clinical laboratory and gastroenterology procedures. Demographic information, clinic details, and laboratory data of individuals with positive results from FIT were abstracted from patients' medical records. Receipt of colonoscopy was confirmed and findings were abstracted using the endoscopy software ProVation (ProVation Medical Inc, Minneapolis, MN). Pathology results were abstracted and reviewed using CoPathPlus platform (Cerner, Canada). Q7

Colonoscopy Data

Colonoscopy quality as measured by bowel preparation and cecal intubation rate was abstracted from procedure reports in ProVation. The quality of colonoscopy preparation was considered adequate if the endoscopist reported the preparation was adequate or at least fair and cecal intubation was achieved.[18] However, failure to reach the cecum in procedures with inadequate preparation were excluded from the calculation.[18] The adequacy of colonoscopy preparation rate was reported based on the first colonoscopy for patients with multiple colonoscopy reports following a positive FIT.

Pathologic Findings

Pathology reports were reviewed for the following findings: cancer, advanced adenoma, and advanced neoplasia. Advanced adenoma was defined as an adenoma that was 10 mm or more in diameter or any size with villous features or high-grade dysplasia. Advanced