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Corresponding author
Yeon Ji Kim, MD, PhD
Department of Internal Medicine,
Yongin Severance Hospital,
Yonsei University College of Medicine,
363 Dongbaekjukjeon-daero,
Giheung-gu, Yongin 16995, Korea
E-mail: dr.kimyj@gmail.com

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Optimizing Treatment of *H. pylori*: The Role of Effective Sample Transport

Yeon Ji Kim

Department of Internal Medicine, Yongin Severance Hospital, Yonsei University College of Medicine, Yongin, Korea

The eradication rate of *H. pylori* varies depending on the treatment regimen, duration of therapy, and regional antibiotic susceptibility patterns. Although there are differences between countries, the efficacy of triple therapy has rapidly declined due to the increasing prevalence of antibiotic resistance.[1,2] A meta-analysis confirmed that the eradication success rates in Korea, which were 82.4% in intention-to-treat (ITT) analysis and 82.5% in per-protocol (PP) analysis in 2001, had decreased to 66.4% (ITT) and 76.4% (PP) by 2013.[3] Consequently, susceptibility-guided tailored therapy has been proposed to overcome antibiotic resistance.[4] Antibiotic resistance varies across regions within the country, and the proportion of multidrug-resistant strains is also high. Tailored therapies are being explored, employing traditional culture-based susceptibility testing or simpler molecular diagnostic methods.[5] The success rates of eradication with these tailored therapies have been reported to be higher than those of conventional treatment, and interest in these therapies is growing as antibiotic resistance is expected to increase. Many studies have shown higher eradication success rates with tailored therapy than clarithromycin-based standard triple therapy.[6-8] Meta-analyses have further supported that tailored therapy is more effective than empirical therapy as first-line treatment (relative risk, 1.14 [95% confidence interval, 1.08–1.21]; I^2=72.2%) without a significant difference in adverse event rates between the two treatments.[9] There is a clear clinical benefit to administering antibiotics with prior knowledge of susceptibility status. However, *H. pylori* is difficult to culture from gastric biopsy specimens due to its fastidious nature; precise conditions and expertise are required to successfully isolate this bacterium, making culture quite limited. Culturing is rarely feasible in hospitals or outpatient endoscopy centers, and gastric biopsy samples must be sent to commercial laboratories under strict transport conditions. Although research studies report 80%–90% success rates in culturing strains, U.S. clinical settings have reported culture success rates as low as 30%.[10] Adding to these difficulties is the limited number of laboratories dedicated to *H. pylori* culture, which are unevenly distributed around the world. Therefore, while bacterial culture remains a useful tool for monitoring first-line antibiotic resistance in epidemiological studies, its practical utility in routine clinical settings remains controversial. The constraints associated with the isolation and culture of *H. pylori* have led to concerns about the feasibility and reliability of this approach to guide individualized treatment in routine practice, and its widespread commercialization and application in first-line care is still in question. Guidelines from various regions around the world emphasize the importance of culture testing primarily after second-line treatment failure in clinical practice. However, there is still no consensus on the optimal timing for such testing.[4,11,12] When Hp-EuReg, a European non-interventional registry for the management of *H. pylori* infection, analyzed data from 21801 patients undergoing upper endoscopy up to December 2020, *H. pylori* cultures were performed in only 9.5%, or 3974 patients.[13] Antibiotic susceptibility registries that include regional data from across North America are still lacking, with cultures only recently being performed at a few major commercial laboratories.[14] Therefore technology that can accurately transport specimens to appropriate testing institutions can help overcome these limitations. According to past studies, appropriate temperature management and minimizing transport time are considered essential factors in increasing the success rate of *H. pylori* culture, and the transport condition of tissues seems to be particularly important in terms of temperature.[15,16] However, such studies are extremely rare, and there is little evidence to support the degree of clinical reliability of the results.

This study evaluated the feasibility of isolating *H. pylori* from rapidly frozen gastric biopsy specimens for antibiotic susceptibility testing.[17] Among 113 patients from eight institutions in Korea, *H. pylori* was successfully cultured in 77.0% of cases. Antibiotic resistance rates for six drugs ranged from 1.1% to 34.5%, including amoxicillin and clarithromycin. The results demonstrate that frozen biopsy specimens can be effectively used for *H. pylori* isolation and resistance testing, supporting nationwide antibiotic resistance surveillance. A key finding of this study is that the overall culture success rate exceeded 77.0% when gastric biopsy specimens were placed directly into Eppendorf tubes and immediately stored in dry ice. However, one drawback is that in institution 5, specimens were refrigerated for several hours before freezing, contributing to a lower overall culture success rate. This finding reaffirms the importance of proper specimen handling and storage procedures, providing a solid foundation for developing appropriate guidelines in future large-scale national studies and clinical practice guidelines. It demonstrated the feasibility of using fresh-frozen biopsy specimens for *H. pylori* isolation and antibiotic susceptibility testing, allowing sites with limited access to susceptibility testing to send samples to a central laboratory. I believe this study will build on this work to provide key antibiotic resistance data to help inform effective treatment planning for *H. pylori* treatment strategies.

ORCID iD

Yeon Ji Kim https://orcid.org/0000-0001-9823-577X

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