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Title **Predictive Genetic Testing for Hereditary Breast and Colorectal Cancer**

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Aim and Method

The aim of this assessment was to analyze the current scientific knowledge and the situation of genetic counseling on predictive genetic testing for hereditary breast and colorectal cancer. Predictive genetic testing will be available for several common diseases in the near future, and questions related to reimbursement and quality assurance will be raised.

This report is based on a nonsystematic literature search using several databases (eg, EMBASE, MEDLINE, Cochrane Library), a CCOHTA assessment, and a US review (American Gastroenterological Assoc.). In addition to the scientific basis on genetic testing, the authors describe and analyze the different diagnostic testing methods and the benefits of early detection methods and prophylactic interventions in the context of individual/familial and social consequences.

Background

Breast and colorectal cancer are among the most frequent cancer diseases. Most are based on random accumulation of risk factors, 5% to 10% show a familial determination. A hereditary modified gene is responsible for the increased cancer risk. In these families, the high tumor frequency, young age at diagnosis, and multiple primary tumors are striking.

Results and Conclusion

Genetic diagnosis: The sequence analysis is the gold standard. Denaturing high performance liquid chromatography/ DHPLC is a fast alternative method. The identification of the responsible gene defect in an affected family member is important. If the test result is positive, it is still uncertain if the disease will occur, when and to what degree founded in the geno-/phenotype correlation. The individual risk estimate is based on empirical evidence. The test results have effects on the entire family.

Prevention/early detection: Currently, primary prevention is not possible except for familial adenomatous polyposis (FAP). The so-called preventive medical checkups are – in reality – early detection examinations. The evidence on early detection methods is better for colorectal cancer than for breast cancer.

Prophylactic surgical interventions: Prophylactic mastectomy (PM) reduces the relative breast cancer morbidity risk by approximately 90%. The question is whether PM influences mortality. Acceptance of PM depends on culture. Colectomy can be used as a prophylactic (FAP) and therapeutic method. After surgery, the cancer risk remains high. Hence, early detection examinations are still necessary.

Counseling: The clinical evidence is often fragmentary and of limited quality. The patient is exposed to so-called objective scientific data. The presentation of the data and the interpretation of the genetic information on sensitivity, specificity, positive predictive value, and number needed to screen or treat are important to understand and to use in making personal decisions.

Reflections: New identification of mutations and demand stimulated by false/inappropriate understanding of genetics will result in an increase in predictive genetic testing and counseling. The gap is wide between predictive genetic diagnosis and prevention, early detection, and therapeutic interventions. These circumstances require a basic strategy. Since predictive genetic diagnosis is a sensitive societal issue, it is important to deal with it carefully to avoid inappropriate hopes and/or discrimination.

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