PTEN gene expression testing in Non-Small Cell Lung Cancer (NSCLC)

Record Status
This is a bibliographic record of a published health technology assessment. No evaluation of the quality of this assessment has been made for the HTA database.

Citation

Authors' conclusions
Lung cancer is the most common cause of cancer-related deaths in the United States. It is estimated that 228,190 Americans were diagnosed with lung cancer and 159,480 died of the disease in 2013. Lung cancer predominantly affects older individuals with a median age of 70 years at diagnosis from 2006 to 2010. The largest risk factor to develop lung cancer is cigarette smoking, which is responsible for 80% of lung cancer cases. Those who are current smokers are 25 times more likely to die from lung cancer, compared with those who have never smoked. Other risk factors include occupational or environmental exposure to secondhand smoke, asbestos, certain metals (chromium, cadmium, arsenic), some organic chemicals, radiation, air pollution, diesel exhaust, and paint. The World Health Organization (WHO) divides lung cancer into 2 major classes based on its biology, therapy, and prognosis: non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). NSCLC accounts for > 85% of all lung cancer cases, including 2 major types: non-squamous carcinoma (including adenocarcinoma, large-cell carcinoma, and other cell types) and squamous cell (epidermoid) carcinoma. Adenocarcinoma is the most common type of lung cancer seen in the United States and is also the most frequently occurring cell type in nonsmokers. Prognostic factors that are predictive of survival in patients with NSCLC include stage of disease at diagnosis, performance status (PS), weight loss, and sex. Only 15.3% of lung and bronchial cancers are diagnosed at the local stage. Annual screening with chest x-ray has not been shown to reduce lung cancer mortality. The National Comprehensive Cancer Network (NCCN) Guidelines for Lung Cancer Screening recommend low-dose computed tomography (CT) for select high-risk current and former smokers without symptoms of lung cancer. However, the American Cancer Society (ACS), the American College of Chest Physicians (ACCP), and the American Society of Clinical Oncology (ASCO) have also issued initial lung cancer screening guidelines. The ACS, ACCP, and ASCO have endorsed shared decision making with a clinician for adults with lung cancer. The NCCN Guidelines recommend that diagnostic strategy for NSCLC be performed in a multidisciplinary setting and be individualized for each patient, depending on the size and location of the tumor, the presence of mediastinal or distant disease, patient characteristics (e.g., comorbidities), and local experience. Molecular diagnostic studies have revealed several biomarkers as predictive and prognostic markers for NSCLC. Response to chemotherapeutic agents is variable, even among individuals with the same tumor type. It has been observed that a number of different biomarkers may help to predict which tumors are likely to respond compared with those that are unlikely to respond. The phosphatase and tensin homolog (PTEN) gene is located on chromosome 10 and serves as a tumor suppressor gene. Germline variants in the PTEN gene are associated with Cowden syndrome and Bannayan-Ruvalcaba Riley syndrome (BRRS), which result in hamartomatous polypos of the gastrointestinal tract, mucocutaneous lesions, and increased risk of developing neoplasms. The major function of PTEN is down-regulation of the complex pathways that affect cell growth, migration, and apoptosis. Therefore, loss of PTEN expression or PTEN inactivating variants lead to unregulated cell growth. Somatic variants in the PTEN gene have been observed in multiple sporadic tumor types, including endometrial, prostate, and glioblastomas.

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