Early Detection of Colon Cancer

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Technology description

BACKGROUND
Colorectal cancer is the second leading cause of cancer-related deaths and the third most common cancer in the US and other Western countries. Adenomatous polyps are well-known, clear-cut histologic lesions that have been identified as precursors to colorectal cancer. Therefore, polyps are of critical importance in the early identification and potential prevention of colorectal cancer. These pre-cancerous lesions are very common in the normal population, with frequencies of 30-40% in people 60 years and older. Fortunately, they can often be removed easily and in a time/cost effective way before they develop into actual cancers.
Polyps recur in a statistically significant subset of people who undergo polypectomy. Currently, there are no predictive factors to determine who will have recurrent polyps and eventually colon cancer among polypectomy patients, although people with high-grade polyps are believed to have a worse prognosis. As a consequence, the only method presently available for the diagnosis of colon lesions and determination of their prognosis is direct examination by a pathologist. This is a very approximate and subjective approach, however, and there is a need for markers that could help clinicians decide which high-grade polyps are more likely to become colorectal cancer.
INNOVATION
Amplification of a region of human chromosome 20 is a frequent event in colon adenocarcinomas, occurring in approximately 70% of cases (or ~35%, when correction for chromosome 20 polysomy is applied). Researchers at the University of California have now found that intermediary diagnostic states of the adenoma to adenocarcinoma sequence that are thought to be the immediate precursors of adenocarcinoma, such as high-grade dysplasia and intramucosal carcinoma, also display increased copy number of this chromosomal region. Specifically, the researchers found amplifications of this region in approximately 40% (or ~30%, when correction for chromosome 20 polysomy is applied) of high-grade dysplasia lesions and intramucosal carcinomas. Methods of screening for colon carcinoma precursor cells by determining the presence of increased copy number of this region are covered by a U.S. patent assigned to the University of California (see below).

Application area

Diagnosis in humans: Detection of increased copy number of the chromosome 20 region in colon tissue polyps could be used to diagnose/confirm the stage and therefore the gravity of the lesion.

Prognosis: The presence of increased copy number of the chromosome 20 region in high-grade dysplasia /intramucosal carcinoma lesions may be useful in predicting whether the lesions will have features similar to the invasive colon carcinomas. Thus, this assay could potentially become an important tool in decision-making for both surgery and therapy of those patients that have high-grade preadenomatous lesions.
Research in the area of tumorigenesis.
Drug discovery: Proteins coded by genes mapping to the chromosome 20 region that are differentially expressed in tumors having copy number alterations of this region may be candidate targets for tumor-specific drug development.

Advantages

Detection of increased copy number of the chromosome 20 region, either alone or in addition to pathology, could provide a more objective, reliable measure for adenocarcinoma and adenoma diagnosis and prognosis than pathology alone.
The new methods may be particularly useful in the diagnosis of precursor states, which are often difficult to diagnose using traditional pathological methods but, unlike carcinomas, are uniformly curable.

Institution

University of California, Los Angeles

Inventors

Dennis Slamon
Professor
MED-HEMAT
Giovanni Pauletti
MED-HEMAT

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com