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Evolution of a system for surgical treatment of adenocarcinomas

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Current imaging and exploration of the surgical field using inspection and palpation provides the surgeon with limited information for clinical decision making. Using colorectal adenocarcinoma as a model, we developed a "system" that incorporates currently available technologies to increase the precision of tumor imaging before and during surgery. The system has three parts: 1) a tumor-related marker, 2) a labeled molecular probe, and 3) instrumentation for imaging and/or detection of the labeled tumor. The glycoprotein TAG-72 is expressed in more than 80% of adenocarcinomas of the: colon and rectum, pancreas, lung, prostate, endometrium, and ovary. We utilized three different generations of 125I-labeled murine IgG antibodies to TAG-72. Our earlier studies used a hand-held gamma probe for the detection and excision of TAG-72 positive tissues. Follow-up studies clearly demonstrated that, independent of the pathologic stage, patient survival was significantly better if all of the TAG-positive tissue was removed. In the last 25 tears the "system" has evolved to the use of low energy labeled, small, molecular probes that allow for combined intraoperative imaging and detection. We bioengineered humanized, single chain, fragments and its "mers", to TAG-72 that minimize murine antibodies associated problems. 123I-labeling of these small molecules provides an optimal signal-to-noise ratio. The "System" now allows for preoperative SPECT/CT imaging to determine actual disease extent prior to surgery and for using a portable gamma camera for real-time intraoperative imaging while retaining hand-held-gamma probe detection of TAG-72 positive tissue. Proof-of-concept studies clearly demonstrate that the surgeon can "get it all".

Biography

Charles L Hitchcock is an Emeritus Faculty member of the Department of Pathology at The Ohio State University in Columbus, Ohio USA. For the last 35 years, he has been a member of a multidisciplinary team of physicians, engineers, chemists, and biomedical scientists whose goal is to provide physicians with the resources to optimize the treatment of patients with solid tumors. Their efforts have resulted in over 500 publications and abstracts, multiple research grants, patents, and several biotech companies.

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