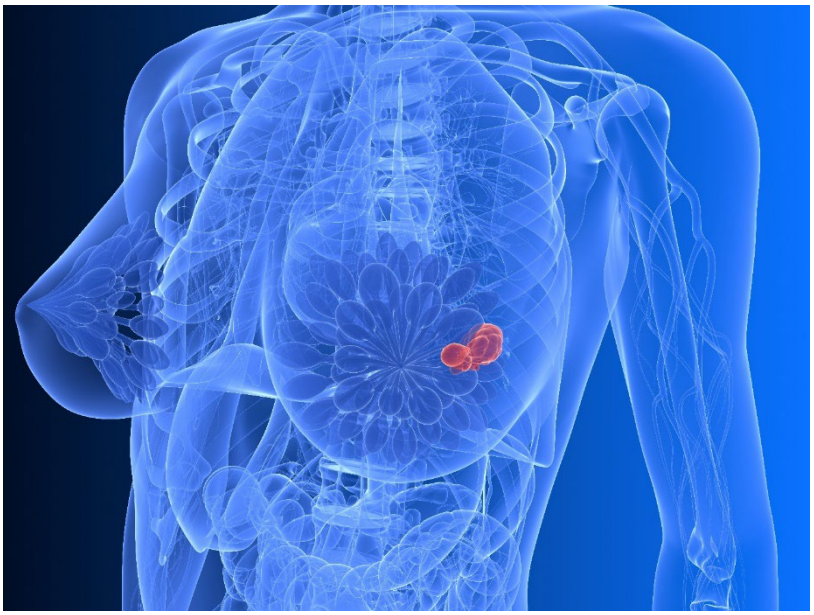
IN VIVO DETECTION OF BREAST CANCER BY FLUORESCENCE SPECTROSCOPY USING AN OPTICAL FIBER NEEDLE PROBE

SEDI-ATI designs optical fiber needle probes for the early diagnosis of breast cancer using a fluorescence detection technique. This is a less traumatic preliminary step for the patient as it is intended to confirm or rule out the need for a biopsy.

Breast cancer is women's major cancer cause of death. Early detection, i.e., at an early stage of cancer development, can lead to more effective treatment.

When a suspicious mass is detected by mammography, the patient must undergo additional tests to determine whether it is a benign or malignant tumor. Indeed, a mammogram or ultrasound cannot tell whether cancer cells are present.



80% excess biopsies

In practice, it is then necessary to perform a percutaneous tissue sampling, i.e., a biopsy, to analyze the cells in situ. This invasive procedure is often traumatic for the patient since it involves making an incision of a few millimeters to introduce a large needle up to the suspect lesion. Several samples are taken using the needle to cut tissue fragments. The procedure can last up to an hour under local anesthesia and can have painful consequences, especially when it is a macro biopsy. The samples are then analyzed by a specialized laboratory, and the result is not known until several days later. Moreover, the American Journal of Surgical Pathology via Eurekalert denounces a routine examination carried out systematically when 80% of biopsies prove to be negative.

Immediately reassure 4 out of 5 patients

To avoid this traumatic experience for many women with benign abnormalities, SEDI-ATI contributes to the development of a substantially less uncomfortable method to detect cancer cells in real-time: in-vivo investigation by fluorescence spectroscopy! This examination would immediately reassure up to 80% of patients, i.e., 4 out of 5 patients.

An innovative medical device understudy

SEDI-ATI has designed a medical device that consists of an optical probe in the form of a small needle inside which is inserted an optical fiber. The profile of the needle, similar to that of vaccine needles, would allow it to pass through the skin without prior incision. Under ultrasound guidance, the probe would be introduced down to the suspect lesion. It will then illuminate the cells with laser light. Without even injecting a marker product (fluorochrome), the cells will fluoresce, that is, they will emit their own light in response to the excitation caused by the incident light. This light will then be captured and guided to a detector by the same optical fiber. By observing how the illuminated tissue scatters the light, the specialist can immediately confirm and refine his diagnosis of suspicious lesions. This examination is not intended to eliminate biopsies. It is intended to be a preliminary step that would significantly reduce the number of unnecessary biopsies.

The system requires clinical evaluation

Tests on tumor masses that have already been removed were carried out at the Gustave Roussy Cancer Institute in Villejuif, France. Further test phases are required to eventually apply this procedure to patients.

Call for projects

SEDI-ATI is at your service. Do not hesitate to approach us to discuss applications that might require the use of such a device, even in non-medical fields.

Focus on SEDI-ATI's optical fiber needle probe for in vivo fluorescence detection

SEDI-ATI has acquired very specific know-how in the integration of an optical fiber into a metallic needle.

Fibre needle probes are suitable for spectroscopy applications in the medical field and food industry. They are also particularly well suited for invasive in-vivo protocols.

Because they can withstand high-powered laser beams, fiber optic needles can also be used as laser scalpels for surgical or research applications where they will cut through organic materials.

We have the ability to custom design probes to meet our customers' needs. We can offer needles of a specific length and size. In the needle, we can insert singlemode optical fibers as well as multimode fibers with core diameters ranging from 200 µm to 600 µm. The probe can be terminated with either an FC/PC, FC/APC, or SMA connector to match the power level required by the application.

Main features

- hypodermic needle with excellent tissue penetration; bespoke length, gauge, and polishing angle
- USP Class VI certified material, non-toxic and biocompatible for medical applications
- singlemode optical fibers and multimode optical fibers up to 600 µm core diameter; custom lengths
- FC/PC, FC/APC, or SMA connector depending on the power level required

Bringing light into your customized, complex or extreme environment is our challenge!

About SEDI-ATI Fibres Optiques

SEDI-ATI Fibres Optiques, founded in 1972, designs, develops and manufactures fiber optic components and assemblies, such as couplers, wavelength division multiplexers, or complex solutions integrating optical fibers. SEDI-ATI specializes in the harsh and extreme environments of its main market sectors, which are military, aerospace, industrial, medical, communication, and astronomical applications. More specifically in the medical field, SEDI-ATI designs, and manufactures, upon customer specifications, biocompatible and sterilizable fiber optic medical devices, as well as fiber optic arrangements for spectrometry and sensors.

More information

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