



# Photoacoustic Physio-Chemical Tissue Analysis

TECHNOLOGY NUMBER: 5981



## OVERVIEW

Photoacoustic physio-chemical analysis (PAPCA) is an advanced medical imaging technology that simultaneously measures both physical and chemical biomarkers in tissue, enabling more precise, objective disease diagnosis.

- Combines photoacoustic and spectral ultrasound techniques to create a 2D spectrogram map of chemical and physical features in tissue.
- Unlocks highly sensitive, reproducible, and quantitative diagnostics for diseases such as liver disease, cancer, and inflammation.

## BACKGROUND

Medical imaging has revolutionized disease diagnosis and monitoring, yet current technologies often face limitations in quantifying key biomarkers. Photoacoustic imaging (PAI) offers deep tissue imaging by detecting sound waves generated by laser pulses, but typical images are qualitative and hard to reproduce, making objective comparisons challenging.

Ultrasound spectrum analysis (USSA) better quantifies physical tissue features but cannot provide information about underlying chemical structures, limiting diagnostic specificity and sensitivity—especially for complex diseases like liver fibrosis and mild fatty liver.

Globally, there is a growing demand for imaging tools that are noninvasive, accurate, and cost-effective, as chronic diseases (e.g., NAFLD, cancer) become more prevalent. The market

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## Category

Diagnostics  
Life Sciences  
Innovation Spotlight

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increasingly seeks quantitative solutions that address these gaps, supported by trends toward precision medicine and preventative healthcare.

## **INNOVATION**

PAPCA works by shining controlled pulses of light onto a tissue sample and measuring the resulting sound waves across many colors of light and sound frequencies. These measurements are processed into a two-dimensional map that reveals both the chemical composition (along the color axis) and physical microstructure (along the frequency axis) of the tissue.

Unlike existing methods, PAPCA merges both chemical and physical tissue analysis in a single, objective assay, dramatically improving reproducibility and quantification. This means diseases can be detected earlier, differentiated more accurately, and monitored with greater reliability than ever before. It also enables robust comparison between patient cases and across different clinics—a leap forward compared to the variable results of current imaging systems.

## **ADDITIONAL INFORMATION**

### **INTELLECTUAL PROPERTY:**

[US10746706 "Photoacoustic physio-chemical tissue analysis"](#)