

# Focused Ultrasound Overview

## The Technology

Focused ultrasound is an early-stage, revolutionary, noninvasive therapeutic technology with the potential to improve the lives of millions of patients with a variety of serious medical disorders. It provides an alternative or complement to surgery, radiation therapy, drug delivery and cancer immunotherapy.

This game changing disruptive technology has the potential to increase the quality and longevity of life and decrease the cost of care by transforming the treatment of a range of indications including:

- **benign and malignant tumors of the brain, breast, prostate, liver and pancreas**
- **Parkinson's and Alzheimer's disease and epilepsy**
- **depression and obsessive compulsive disorder**
- **arthritis and hypertension**
- **uterine fibroids**

Focused ultrasound treats tissue with multiple intersecting beams of high-frequency sound focused accurately on targets deep in the body without damaging surrounding structures, much like beams of light can be focused on a point with a magnifying glass. At the focal point where the beams converge, the ultrasound energy can act in multiple ways to induce a variety of biological effects enabling the treatment of a wide variety of medical disorders. Currently there are 18 mechanisms of action under study including:

### TISSUE DESTRUCTION

- **Thermal Ablation:** coagulative cell death
- **Histotripsy:** mechanical cell disruption
- **Microvascular disruption:** ischemic cell death
- **Sonodynamic therapy:** activation of cell toxic drugs

### IMMUNOMODULATION

- **Tumor cell disruption:** increased immune cell trafficking; exposure of tumor antigens and release of cytokines
- **Augmentation of immunotherapy drugs**
- **Enhanced drug delivery**

### DRUG DELIVERY

- **Focal delivery of therapeutic agents**
- **Increase vascular permeability and blood-brain barrier opening**
- **Increased cell membrane permeability**

### RADIATION

- **Alternative to ionizing radiation**
- **Decreased radiation dose:** tumor preconditioning and sensitization

For a complete description of all 18 mechanisms of action, see the Foundation's website [www.fusfoundation.org/the-technology/mechanisms-of-action](http://www.fusfoundation.org/the-technology/mechanisms-of-action).

There are currently more than 100 clinical indications or disorders in various stages of development and the number is increasing rapidly. Most are early stage. Worldwide 23 indications have regulatory approval and in the US five have been approved by the FDA. Focused ultrasound is not for every patient or every disorder. Much work remains to be done to determine where this technology provides unique cost effective value. For a list of all clinical indications, see the Foundation's website [www.fusfoundation.org/diseases-and-conditions-all/overview](http://www.fusfoundation.org/diseases-and-conditions-all/overview).

## The Problem

It can take decades for a new therapeutic technology like focused ultrasound to become a mainstream standard of care. Every year that is subtracted from that process could reduce death, disability and suffering for countless people.

## The Focused Ultrasound Foundation

### SAVING TIME = SAVING LIVES

The Foundation is a unique medical research, education, and advocacy organization created as the catalyst to accelerate the development and adoption of focused ultrasound. To achieve its goals, the Foundation utilizes an approach that is entrepreneurial, high-impact, high performance, market-driven and results oriented.

By identifying opportunities and overcoming barriers, the Foundation is shortening the time from laboratory research to widespread treatment. Major initiatives include:

- Influencing the direction of the field, setting research priorities, and creating an urgent, patient centric culture
- Providing resources, both human and financial capital
- Fostering collaboration and stimulating innovation
- Creating, aggregating and sharing knowledge
- Cultivating the next generation of clinicians and scholars
- Increasing awareness

The Foundation has a robust research program and organizes, conducts, and supports clinical trials and pre-clinical laboratory studies with an emphasis on brain disorders, cancer, and immunotherapy. It is the largest non-governmental source of focused ultrasound research funding.

## Board of Directors

### Neal F. Kassell, MD

Chairman, Focused Ultrasound Foundation  
Former Co-chair of Neurosurgery,  
University of Virginia

### Dorothy N. Batten

Founder, iThrive Initiative  
Former Director, Landmark Communications, Inc.

### Lodewijk J.R. de Vink

Founding Partner, Blackstone Healthcare  
Partners, LLC  
Former Chairman & CEO, Warner-Lambert

### Eugene V. Fife

Founding Principal, Vawter Capital, LLC  
Former Chairman, Goldman Sachs  
International

### John R. Grisham

Author

### William A. Hawkins III

Lead Director, Immucor, Inc.  
Former Chairman & CEO, Medtronic

### Daniel P. Jordan, PhD

President Emeritus, Thomas Jefferson  
Foundation, Inc.

### Edward J. "Ned" Kelly, III, JD

Former Chairman, Institutional Clients Group,  
Citigroup  
Chairman, CSX Corporation

### Edward D. Miller, MD

Former CEO, Johns Hopkins Medicine

### Frederic H. Moll, MD

Co-founder, Intuitive Surgical  
Chair & CEO, Auris Surgical Robotics, Inc.

### Steve H. Rusckowski

President and CEO, Quest Diagnostics Inc.  
Former CEO, Philips Healthcare

### Charles Steger, PhD

Former President, Virginia Polytechnic Institute  
and State University (Virginia Tech)

### Andrew C. von Eschenbach, MD

President, Samaritan Health Initiative  
Former Commissioner, U.S. Food and Drug  
Administration  
Former Director, National Cancer Institute

### Carl P. Zeithaml, PhD

Dean and F. S. Cornell Professor of Free  
Enterprise, McIntire School of Commerce,  
University of Virginia

## Council

Co-chairs

### Jane P. Batten

### Charles H. Seilheimer, Jr.

.....

### John B. Adams, Jr.

### Ellen Block

### Charles F. Bryan, Jr., PhD

### T. Michael Cashman

### Nancy J. & Thomas N. Chewning

### Marguerite & Norwood Davis

### Diane Heller

### Cecelia S. Howell

### Dean L. Kamen

### Ann Kingston

### Syaru Shirley Lin, PhD

### Amanda Megargel

### Jonna & Tony Mendez

### Michael Milken

### Pamela Minetti, MBA

### Paula F. Newcomb

### Wyndham G. Robertson

### Mary Lou Seilheimer

### Alice H. Siegel

### Kimberly P. Skelly

### Aaron Stern, MD, PhD

### Fredi & Howard Stevenson

### Jane M. Tolleson

### Meredith Jung-En Woo, PhD

### Linda K. Zecher

## Focused Ultrasound Foundation

For more information, visit [www.fusfoundation.org](http://www.fusfoundation.org) or contact, Nora Seilheimer, [nseilheimer@fusfoundation.org](mailto:nseilheimer@fusfoundation.org)  
1230 Cedars Court , Suite 206 | Charlottesville, VA 22903 | 434.220.4993