

# Focused Ultrasound Overview

## The Technology

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

This revolutionary 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 19 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
- **Gene therapy:** activation of apoptotic cell death

### IMMUNOMODULATION

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

### DELIVERY OF THERAPEUTIC AGENTS

- **Drugs, genes, growth factors, and stem cells**
- **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 19 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 125 clinical indications or disorders in various stages of development, and the number is increasing rapidly. Most are early stage. Worldwide 31 indications have regulatory approval; in the US, six 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).

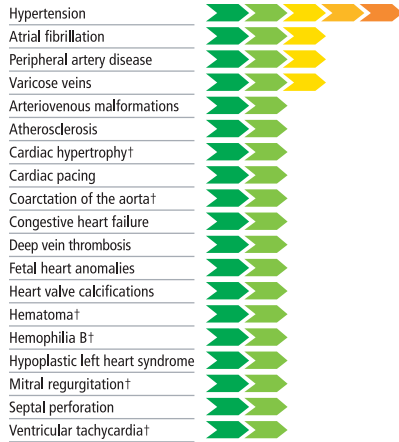
## The Problem

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.

# Development Status



## Cardiovascular



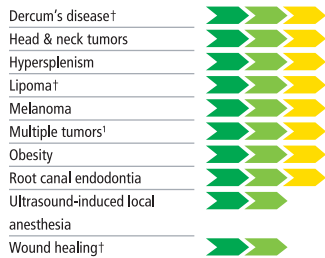
## Endocrine Disorders



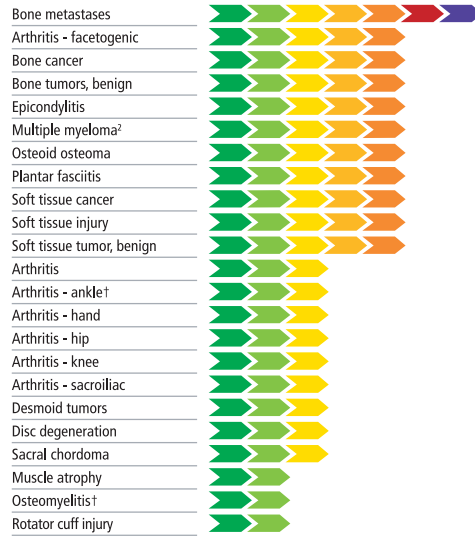
## Gastrointestinal



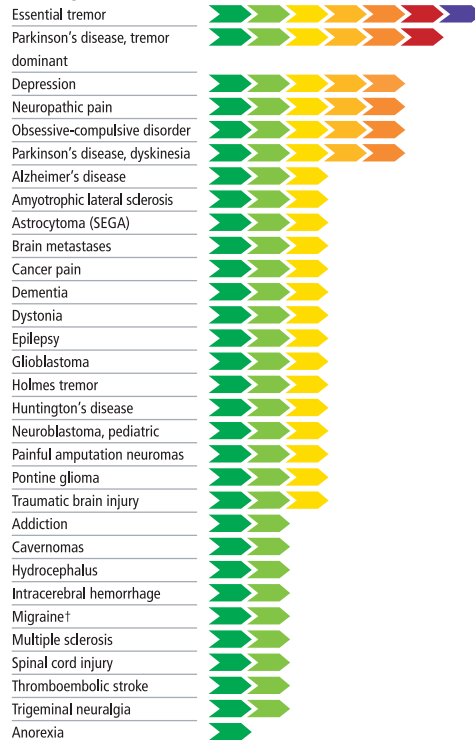
## Miscellaneous



## Musculoskeletal



## Neurological



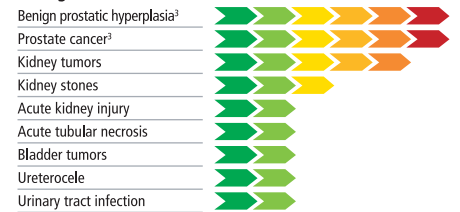
## Ophthalmological



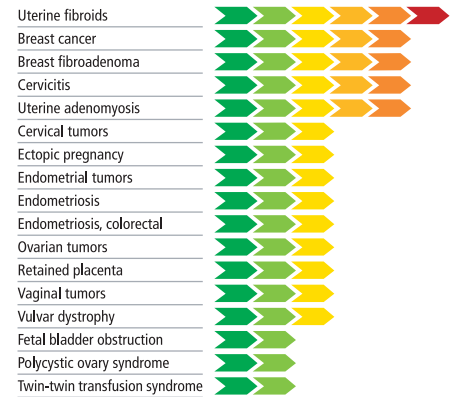
## Pulmonary



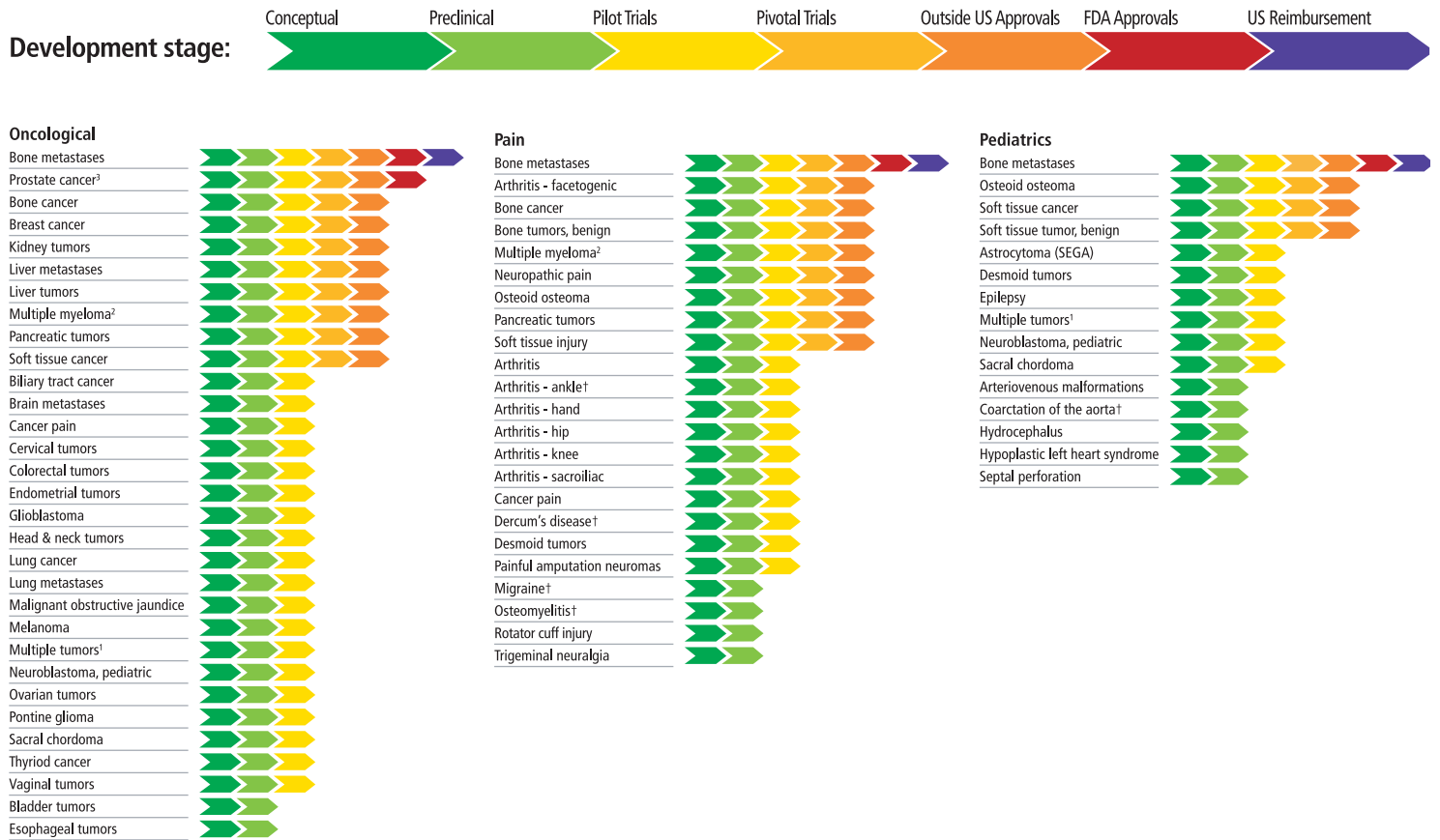
## Urological



## Women's Health



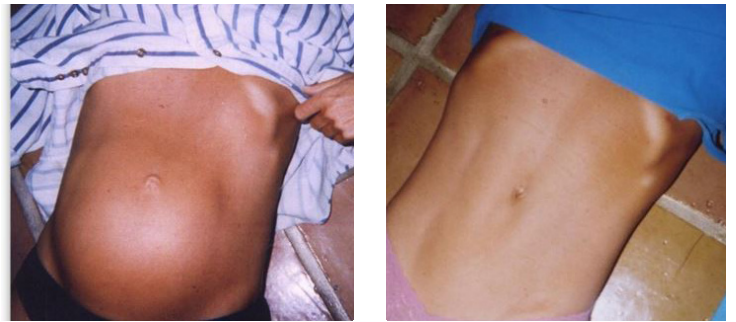
# Development Status



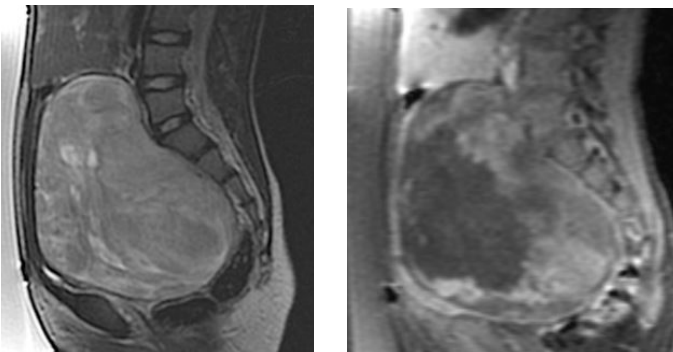
Desmoid tumor



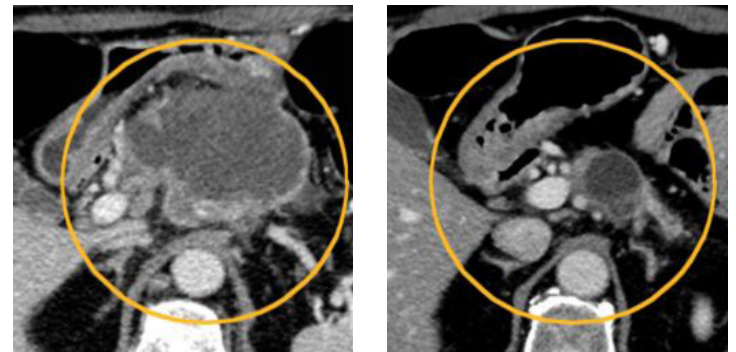
Uterine fibroid



Pelvic tumor



Pancreatic cancer



## 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 and thereby reduce death, disability, and suffering for countless patients. 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.

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## 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)  
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