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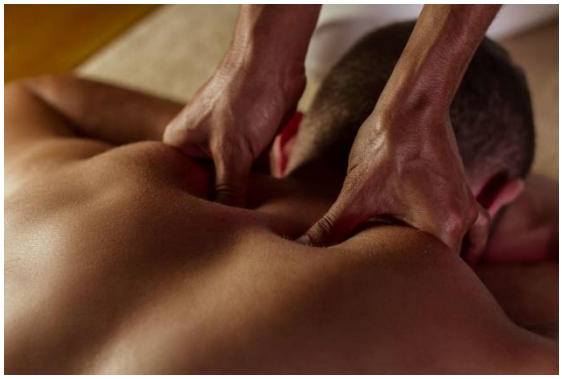
Health & Science

Everywhere in your body is tissue called fascia. Scientists are unlocking its secrets.



Massage can affect the body's fascia, a three-tiered layer of tissue that encases tissues and organs. Researchers say fascia exists throughout our bodies and has the potential to influence everything. (iStock)

By Rachel Damiani and Ted Spiker

Americans, who spend about $8 billion a year in massage and chiropractic treatments to relieve pain, may have no idea that they're all probably experiencing the same thing — a manipulation of their fascia, a three-tiered layer of tissue that encases tissues and organs.

Although some people who are kneaded, stretched, or cracked may have a vague notion that fascia exists, they probably don't know much about their fascia — or understand why it even matters.

Some in the scientific and medical communities think the same way.

They cannot agree on what fascia is. They don't know what fascia does. They may not even know it when they see it. (One scientist, when asked about fascia, had to look it up to try to define it. And a scientific group, the Fascia Nomenclature Committee, has devoted itself to resolving this language confusion.)

But this is what they suspect: As the only tissue that modifies its consistency when under stress (it's your body's shape-shifter, of sorts), fascia is a part of the body that inspires equal parts confusion and optimism in research circles.

It's everywhere in the body, so it could affect just about everything. That leaves researchers wrestling with an intriguing dilemma: If fascia is everywhere, then how do you isolate its impact on the body?

Early research suggests it may have relevance in areas one wouldn't normally think of fascia playing a role, such as digestive conditions and cancer.

“Fascia is what holds us together. There are very few diseases that don’t have a fascia component,” said Frederick Grinnell, a professor of cell biology at the UT Southwestern Medical School.

In an article in the Journal of Bodywork and Movement Therapies[1], researchers make the point that this web throughout our body has the potential to influence everything.

“Fascia is involved almost everywhere in the body,” said Andreas Haas, the founder of the Manus Training Center and the Manus Fascia Center in Austria who has been a manual therapist for 30 years and looking at fascia for two decades. “Each organ, each muscle, each artery, each vein, each nerve — there is not one single structure in the whole body that is not connected with fascia or not enveloped by fascia.”

What is fascia?

Best known by murky metaphors (a glove, net or web), fascia — in lay terms — appears differently throughout the body. There is the fascia that almost mimics a muscle with thick tissues, such as the fascia that makes up the plantar fascia in the foot or the iliotibial band along the side of the leg; the IT band is a structure that is unique to humans, and the fascia probably developed as an adaptation to bipedal movement, said Neil Roach, a lecturer in the department of human evolutionary biology at Harvard University.

There is also the fascia that appears all over and acts like a casing — a biological Spanx of sorts. “This fascia throughout the body holds muscles and organs in place to make sure they don’t jostle around,” Roach said.

The characteristic of fascia that is at the forefront of discussion in terms of health implications is its elasticity — that is, higher elasticity of the fascia allows organs and tissues to function better, while stiffer fascia decreases performance. (But that is not completely agreed upon, either; in some areas of the body — the joints, for example — it may be advantageous to have stiff fascia to provide support for anatomical structures, Haas said.)

Carla Stecco, an orthopedic surgeon and professor of human anatomy and movement sciences at the University of Padova in Italy whose father wrote books on fascia, is working to provide clarity to the confusion. She has conducted more than 100 human dissections with the goal of better understanding fascia’s anatomy.

When looking at fascia in a cadaver, fascia rests beneath the skin like mist on a lake. Thin and almost translucent, fascia looks like “white paper,” Stecco said. Past the fat cells, another fascia level — called deep fascia — rests beneath the superficial layer. Even deeper, a third layer called epimysial fascia rests on top of muscles. Out of the body and under the microscope, fascia is composed of a variety of different collagen types, elastin and multiple cell types, including telocytes and fasciocytes.

Scientists are still working to understand what characterizes one fascia layer from the next and distinguishes fascia from other connective tissue. Stecco said she believes this knowledge is vital to understanding fascia's clinical implications.

"Without correct knowledge about fascia," she said, "we really can't think about pathology."

What is known about fascia is that these three fascial layers are not isolated. Rather, they're bound to one another in a 3-D matrix that gives the body structure and helps it function in an "integrated manner," according to the definition put forward from the Fascia Nomenclature Committee.

Long thought of as just the support structure, fascia may have more influence on health than as a passive container.

"I think that understanding about the science of fascia is really important for people who are investigating different ways of being healthy other than surgery or drugs," said Grinnell, a scientist who was initially skeptical about his research related to fascia.

Why does it matter?

Antonio Stecco, the brother of Carla Stecco, and a proud member of the first family of fascia, is a research assistant professor at New York University in physical medicine and rehabilitation who describes fascia's main functions as helping coordinate the body's movements (i.e., biomechanics), position in space (i.e., proprioception) and fluid flow throughout the body.

Related to these functions, research has indicated that structural integration (a type of body work thought to release stiff fascia) has improved balance in patients with chronic fatigue, range of motion in patients with neck pain, and reduced eye spasms in patients with muscular dystonia.

Beyond movement conditions, fascia may also be involved in a variety of unexpected health conditions and diseases, including cancer, lymphedema, and gastrointestinal distress — and many more areas to study, said Antonio Stecco, who reviewed many of fascia's potential clinical implications in a 2016 review paper[2] in the PM&R Journal.

In this paper, Stecco posits a link between fascia and swelling of the arms in the legs (lymphedema). He suggests that stiff fascia decreases lymphatic fluid flow and can contribute to swelling in the limbs.

By releasing fascia through bodywork, it could be possible that fascia becomes more pliable, lymphatic fluid flow increases and swelling goes down. Similarly, releasing fascia could help reduce gastrointestinal distress, including constipation, bloating and acid reflux.

Antonio Stecco hypothesizes that stiff visceral fascia, which Carla Stecco describes as a fourth type of fascia that is related to the internal organs, may decrease the motility of

organs, resulting in distress. Bodywork could make stiff fascia more pliable, facilitate organ functioning and reduce these unpleasant GI symptoms.

Fascia and cancer

One potential role of fascia could be for cancer research. Thomas Findley, an expert on fascia and a professor of physical medicine at Rutgers Cancer Institute of New Jersey, is fighting prostate cancer. He says he performs a series of exercises every day that he hopes may stall the progression of his cancer by releasing his fascia.

Findley said that exercise may slow down development of cancer and that some research suggests that physical activity (which would include weight training) may improve longevity in people once they're diagnosed. But the reason is unclear.

One hypothesis: Fascia, as part of the extracellular matrix, could surround the tumor like a net around a crab. When the collagen in the fascia around the tumor becomes stiff, Findley thinks cancer cells could use it as a direct line out of the net (envision a tumor escaping the area on stiff fascia, like a playground slide). But when the fascia is pliable, the tumor can't escape (envision it being trapped in quicksand with no easy escape route).

A recent study[3] published in Scientific Reports and led by a group of researchers at Harvard Medical School, including Helene Langevin, director of the National Center for Complementary and Integrative Health, indicated that stretching reduced tumor growth in mice. Future studies are necessary to better understand fascia's role in cancer development, however.

The frontier of fascia

The study of fascia is marked by both uncertainty and promise.

"We're really at the nascent phase of identifying fascia," Findley said.

And in these beginning stages, scientists have not yet reached consensus on fascia's potential to affect the body.

Part of this confusion in the medical community could stem from fascia straddling both modern and traditional medicine: two perspectives that are often portrayed as starkly different from one another. Fascia knowledge is generated by both scientists using modern techniques and body practitioners who use alternative medicine techniques, such as yoga and massage.

Grinnell said that while many researchers and body practitioners such as chiropractors focus on fascia, other scientists are less enthusiastic about its potential.

"If you talk to most surgeons, they would think of it as 'what you cut through,'" said Grinnell. "Within the medical community, there are widely diverse opinions about the importance of fascia."

The world's experts have been gathering regularly in their efforts to figure out the potential of fascia. The Fifth International Fascia Congress met in November in Berlin and another event is planned for 2021[4].

"The more we know, the more I realize there's more to learn. Every time you answer a question, it generates more questions," Findley said. "That's kind of the fun part."

Foot Notes

1. Adstrum, Sue, et al. "Defining the Fascial System." NeuroImage, Academic Press, 16 Nov. 2016, www.sciencedirect.com/science/article/pii/S1360859216302595.

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3. Berrueta, L., et al. "Stretching Reduces Tumor Growth in a Mouse Breast Cancer Model." *Nature News*, Nature Publishing Group, 18 May 2018, www.nature.com/articles/s41598-018-26198-7.

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