Drugs showing promise in cancer trials reduce scarring for scleroderma, study shows

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Epigenetic drugs that have shown promise in cancer trials significantly reduce scarring in the cells of patients with scleroderma, an incurable and life-threatening autoimmune disease, a new study shows.

Scleroderma is a chronic disease that affects the immune system, causing a buildup of scar-like tissues in the skin and internal organs known as fibrosis. This process occurs when cells that make up connective tissue, called fibroblasts, produce too much collagen that causes the skin and organs of patients to harden—resulting in tissue damage and organ failure.

In a recent study, Michigan Medicine researchers focused on BETs, which are proteins that regulate gene expression by binding to modifications on proteins around which DNA wraps, a process called epigenetic regulation. Drugs targeting BETs, specifically an isoform called BRD4, have been developed by various pharmaceutical companies for cancer treatment.

Results published in *JCI Insight* reveal that drugs that inhibit BRD4, known to play a role in cancer, also affect fibrosis in scleroderma. Researchers tested BRD4 inhibitors on the skin fibroblasts of scleroderma patients and in mouse models of skin fibrosis. They found that the treatment stopped scarring in both human-derived cells and in animals.

The inhibitors used by Michigan Medicine researchers have shown promise for treating various cancers in preclinical studies. Specifically, one drug used in the recent study, called AZD5153, is being tested in a Phase I clinical trial for sarcomas and lymphomas.

"Through this study, we have uncovered a new class of epigenetic drugs that can be used in scleroderma fibrosis," said Pen-Suen Tsou (Eliza), Ph.D., senior author of the paper and a rheumatology researcher at Michigan Medicine. "If we can repurpose these drugs and get them through development more quickly, we can provide faster relief for patients who struggle with debilitating symptoms of this autoimmune disease. The process can typically take around 10 years, but our patients

cannot wait that long."

The study is a collaborative effort with Michigan Medicine's Scleroderma Program. Tsou's team also found that a calcium signaling protein, called CaMKII, affects fibrosis in scleroderma, which researchers had previously not seen.

"Right now, we are doing some follow up studies to see if inhibitors of this protein can block scarring for scleroderma," Tsou said. "This opens up a brand-new direction for us to offer a novel target for this disease."

More information: Sirapa Vichaikul et al, Inhibition of bromodomain extraterminal histone readers alleviates skin fibrosis in experimental models of scleroderma, *JCI Insight* (2022). DOI: 10.1172/jci.insight.150871

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