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Cystic fibrosis

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The basic mechanism of cystic fibrosis is well understood. A combination of genetic mutations stops the production of or mutates a protein that facilitates the movement of chloride ions across cell membranes. This results in a build-up of mucus in the lungs, pancreas and other parts of the body. Over time, bacterial infections set in, which can ultimately lead to death.

For decades, therapies were palliative, with few people living past their mid-30s. That's now changing rapidly. The most dramatic developments in recent years have been in protein-modification therapies — drugs that restore the function of the cystic fibrosis transmembrane conductance regulator (CFTR) protein (see page S2). A triple-combination therapy now works against the mutation present in more than 80% of people with cystic fibrosis.

Researchers are also pushing ahead on other therapeutic fronts. Gene therapies are of particular interest to people with rare mutations who have been left behind by current protein-modification drugs (S12). Although in development for 30 years, these gene-replacement techniques are just now nearing clinical trials. Meanwhile, an approach that had been considered fringe — the use of bacteria-eating viruses called phages — is showing promising results for people with drug-resistant infections (S8). And others are working on treating the disease *in utero* to minimize the damage it inflicts on a child's organs (S6).

Clinical prospects for people with cystic fibrosis are brightening. Progress in treating the disease has led to growing numbers of people surviving to middle-age and beyond (S16). And a silver lining from the COVID-19 pandemic is that telemedicine for people with cystic fibrosis could become much more routine (S15). But the disease still holds several mysteries. Researchers are looking to genetics and hormones to explain why women with cystic fibrosis seem to have poorer outcomes than men (S10). And perhaps most fundamentally, it is still unclear what level of function is needed in the CFTR protein to restore health (S17).

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Herb Brody
Chief supplements editor

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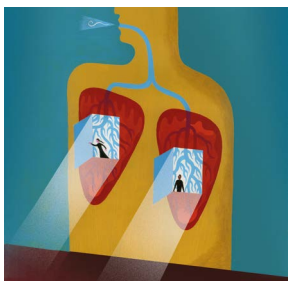

On the cover
Glow from the lungs symbolizes advances in treating cystic fibrosis. Credit: Russell Cobb

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