mRNA technology revolution: Battling sickle cell, aging and other tough-to-tackle diseases will soon be easier and cheaper

The technology in the mRNA covid-19 vaccines can be adapted to deliver genetic material to the blood stem cells in bone marrow, animal studies show. This should lead to better and cheaper treatments for a wide range of conditions, from inherited disorders and infectious diseases such as HIV to even ageing.

“With a single injection, you can modify the fate of cells,” says Stefano Rivella at the Children's Hospital of Philadelphia. “This is the future of medicine. The sky is the limit.”

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A CRISPR gene-editing treatment for sickle cell disease is expected to be approved soon.

But there are two major issues with this approach. Firstly, the personalised nature of the treatment makes it very time consuming and costly.

Secondly, before modified blood stem cells are returned to the body, some of the existing blood stem cells in the bone have to be killed to make room for them. This is done with highly toxic drugs that can cause serious side effects and usually leave people infertile.

Modifying blood stem cells inside the body could solve both these problems, so many teams around the world are working on doing this.

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