

# Scientists decode TREX which could see new treatments for cancer realized

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University of Sheffield scientists have decoded the processes which create proteins in all forms of life which - for the first time - opens the door to fixing these problems which can cause fatal health problems like Motor Neuron Disease, myotonic dystrophy and cancer.

Decoded process could hold the key to future treatments for a wide range of [chronic health problems](#) including [Motor Neuron Disease](#), myotonic dystrophy and a wide range of cancers, University of Sheffield scientists have revealed.

Experts from the University's Department of Molecular Biology and Biotechnology, collaborating with scientists from Harvard Medical School in the USA, have revealed how a complicated set of proteins called TREX act as a passport for the transfer of cell blueprints which create proteins that are essential for life.

The researchers believe their better understanding will mean they can ultimately fix problems in the process which cause fatal [health conditions](#) like Motor Neuron Disease, myotonic dystrophy and a wide range of cancers.

Professor Stuart Wilson, who led the groundbreaking project, said: "[Protein production](#) is an essential part of life for all organisms. This process involves reading the code in genes and converting this to a message which is ultimately decoded to make a [protein](#)."

"The message is made of a special molecule called mRNA. In all [organisms](#) from yeast through to man the mRNA is made in a compartment in the cell called the [nucleus](#), but then has to be transported to a separate compartment, called the cytoplasm, where it is decoded to make a protein. This process of mRNA transport is essential for life and when it malfunctions in humans it can lead to diseases such as Motor Neuron Disease or cancer."

Researchers have shown how proteins called TREX provide a mark on the mRNA which acts as the passport which unlocks a transporter protein called Nxf1, allowing it to land on the mRNA and transport it to the cytoplasm to create proteins.

Professor Wilson added: "When a car is built in a factory, it goes through various stages of production with parts being added and, hopefully, quality control checks before it is driven out of the factory and into the salesroom.

"Similarly mRNA goes through various modifications in the nucleus, with bits added on and other sections removed. Only when the mRNA reaches the end of the production line in the nucleus and passes all the quality control checks is it given the passport which allows it to be transported to the cytoplasm and then used to make proteins.

"Until now, it has not been clear how the cell knows when the mRNA has reached the end of the production line in the nucleus and thus when it should be given a passport allowing passage to the [cytoplasm](#). Now we have identified how the passport is issued, allowing the mRNA transport and the production of proteins in the cell which is essential for life."

The research is being published this week in *Nature Communications*.

Provided by University of Sheffield

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