MicroRNAs make for safer cancer treatments

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Viruses -- long regarded solely as disease agents -- now are being used in therapies for cancer. Concerns over the safety of these so-called oncolytic viruses stem from their potential to damage healthy tissues. Now Mayo Clinic researchers have discovered a way of controlling the viruses behind potential cancer therapeutics. They are engineering the virus's genetic sequence, using microRNAs to restrict them to specific tissues. The microRNAs destabilize the virus's genome, making it impossible for the virus to run amok. The discovery is reported in the current issue of *Nature Medicine*.

"Our findings demonstrate a new tool for molecular medicine that should also help allay concern over the use of viruses as a therapeutic delivery system," says Stephen Russell, M.D., Ph.D., Mayo physician-scientist and lead author of the study.

MicroRNAs are the nucleotide snippets that are encoded by genes, but don't end up as proteins. In many cases, they have a role in down-regulating different cellular genes. In this case, a virus is engineered to be responsive to microRNAs that are present in certain cell types. Using this new form of targeting, researchers redirected a virus normally responsible for a lethal muscle infection to recognize only cancer cells. The laboratory mice that received the engineered virus were cured of established tumors and suffered no ill effects.

Significance of the research

Most viruses can infect different cell types, which leads to the array of symptoms during a viral infection. Now as viruses are being engineered for use as vaccines, cancer therapeutics and gene therapy vectors, researchers want to restrict and redirect the types of cells they do (or don't) infect as additional safeguards against disease. The target sequences of microRNAs used in the study kept the virus from destroying muscle cells while allowing viral replication to proceed in cancer cells allowing the virus to completely cure mice with melanoma.

The Mayo researchers say microRNA target insertion may be a new way to make viruses safer for use in cancer therapy and could lead to new methods of making safer vaccines.

Source: Mayo Clinic