

Fighting liver cancer by re-awakening the immune system

Kaku Goto
Dorcas A. Annan
Tomoko Morita
Wenwen Li
Ryosuke Muroyama
Yasuo Matsubara
Sayaka Ito
Ryo Nakagawa
Yasushi Tanoue
Masahisa Jinushi
Naoya Kato

Video Abstract

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Abstract

Researchers from Japan have discovered a new method for using the immune system to attack liver cancer, the sixth most common cancer in the world. The researchers previously reported that patients with hepatitis had a higher risk of developing liver cancer when they expressed low levels of a gene called MICA. Building on this discovery, they set out to identify whether increasing the expression of this gene offers a way to treat the disease. MICA's normal function is to alert the immune system to cells that are potentially dangerous, including those on their way to becoming cancerous. But if MICA levels drop, the immune system no longer recognizes these cells, allowing them to multiply. To find ways of turning MICA expression back on, the researchers screened a library of over 600 FDA-approved drugs on liver cancer cells and identified a single drug, vorinostat, that greatly increased MICA levels. Their next goal was to find out whether the restored MICA expression could make the immune system recognize and destroy the cancer cells. The team treated cancer cells with either vorinostat or a control and then incubated them with immune cells known as natural killer cells. While the untreated cancer cells were unharmed, those treated with the drug were demolished. Thanks to MICA, natural killer cells could actually see the problematic cells and take action against them. To determine whether the technique would also work in animals, the researchers tested vorinostat in a mouse model of human liver cancer and found that the drug significantly slowed tumor growth. These results highlight an important way in which cancer evades the immune system. In discovering that the MICA gene can activate immune cells to fight tumors, the researchers have pinpointed a new target for treating liver cancer that might one day help overcome the disease.