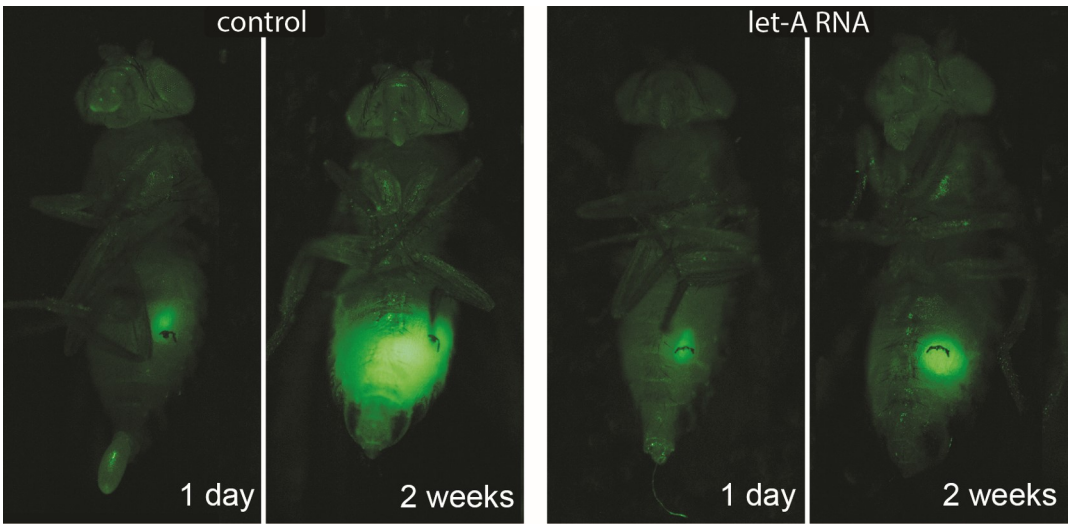
ETH zürich

Licensing Opportunity

A long non-coding RNA as a potent and specific cell death effector of cancer cells



Feeding the long non-coding RNA let-A to flies carrying transplanted tumors (green) leads to reduced growth of tumors.

The oncolytic activity across species, the specificity towards cancer cells, and the efficiency shown in tumor tissue make let-A a promising RNA drug candidate for novel treatments in cancer therapy.

Application

The long non-coding RNA (lncRNA) *let-A* from the fruit fly *Drosophila melanogaster* provides a template for a novel class of cancer treatments. lncRNA *let-A* induces rapid cell death in various human cancer cell types and human tumor organoids.

Features & Benefits

- Oncolytic activity of *let-A* RNA across species
- Broad toxicity in various cancer types including human pancreatic tumor organoids
- No or reduced toxicity observed in cell cultures derived from normal or primary cells
- Less production costs than for proteins and polypeptides

Publications

- "A long non-coding RNA in the *let-7* complex acting as a potent and specific death effector of cancer cells" https://doi.org/10.1101/2021.07.16.452600
- "Inducing oncolytic cell death in human cancer cells by the long non-coding RNA *let-A*" https://doi.org/10.1101/2021.07.16.452707

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Technology Readiness Level

Background

The use of cancer drugs is often restricted to certain cancer types, which lowers their market potential. A challenge is, thus, to find drugs which have a broad application range without harming the healthy cells. Many researches study the effects of small molecules, peptides or antibodies for cancer treatment. The potential of non-coding RNAs, however, has been largely overlooked. There are numerous lncRNAs with regulatory functions, many of which are mutated or differentially expressed in cancer cells. To date, the biological functions of the majority of these RNAs remain elusive, and hence there is a pressing need to characterize them and reveal their true potential in cancer treatment.

Invention

A novel long non-coding RNA was found to activate an evolutionary conserved tumor suppression mechanism common to all cells, thereby offering new options for the treatment of a wide range of cancer types. Laboratory experiments demonstrate that *let-A* RNA successfully induces cell death in human cervical cancer, breast cancer, glioblastoma, pancreatic cancer as well as leukaemia cells. The toxic effect, however, is not observed with non-tumorigenic and more differentiated cell lines, including human fibroblast cells, human primary mesenchymal stem cells (MSC), and differentiated adipocyte and smooth muscle cells. Preliminary experiments furthermore demonstrate an oncolytic activity of *let-A* on organoids produced from pancreatic tumor cells derived from human patients, making this lncRNA a promising candidate for the treatment of highly detrimental cancer types.