Top 10 Cancer Research News Stories of 2020

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This listicle details the top 10 most-read non-COVID-19 cancer research news stories from the field this year, published on Technology Networks.

New cancer vaccine ready for human trials

A team of researchers has designed a novel cancer therapeutic vaccine that has the potential to treat numerous blood cancers as well as solid malignancies including breast, lung, renal, ovarian and pancreatic cancers. It works by targeting cancers that express a highly immunogenic tumor-associated antigen – transcription factor Wilms' tumor 1 (WT1). The team published findings from a preclinical study in July 2020.

“Our vaccine, called CLEC9A-WT1, is an antibody specific for CLEC9A that acts as a guided missile to specifically deliver WT1 to the key dendritic cell subset responsible for initiating cancer-specific immune responses,” – Associate Prof. Kristen Radford (https://www.materresearch.org.au/Researchers/Our-researchers/researcher?r=351), Mater Research.

Published in: Clinical & Translational Immunology (https://onlinelibrary.wiley.com/doi/full/10.1002/cti2.1141)
Related coverage (https://www.technologynetworks.com/cancer-research/articles/new-vaccine-has-the-potential-to-treat-several-different-cancers-337969)

Nanoparticle “trojan horse” triggers cancer cells to self-destruct

Researchers from the Nanyang Technological University have developed a novel therapeutic strategy to treat cancer that causes the diseased cells to self-destruct. The team modified a silica nanoparticle by coating it with L-phenylalanine, an essential amino acid. The amino acid “armor” acts as a trojan horse – concealing the nanotherapeutic on the inside. In experiments using mice, the nanoparticle was shown to kill cancer cells effectively and precisely.

“By removing the drug component, we have effectively simplified the nanomedicine formulation and may overcome the numerous technological hurdles that are hindering the bench-to-bedside translation of drug-based nanomedicine,” – Assistant Prof. Dalton Tay (http://research.ntu.edu.sg/expertise/academicprofile/Pages/StaffProfile.aspx?ST_EMAILID=CYTAY&CategoryDescription=nanotechnologynanoscience), Nanyang Technological University.


Blood test detects more than 50 cancer types, often before symptoms present

In a paper published in March 2020, researchers show that a blood test could detect more than 50 different types of cancer, with a false positive rate of < 1%. The test was able to predict the tissue in which the cancer originated in 96% of samples and it was accurate in 93% of cases. The test works by analyzing aberrant methylation patterns and detecting the subsequent changes in gene expression responsible for driving tumor growth.

“Considering the burden of cancer in our society, it is important that we continue to explore the possibility that this test might intercept cancers at an earlier stage and, by extension, potentially reduce deaths from cancers for which screening is either not available or has poor adherence,” – Dr Michael Seiden, president of The US Oncology Network (https://usoncology.com/).
Newly discovered T cell could represent dawn of “universal” cancer therapy

Scientists have uncovered a novel type of killer T cell. This discovery could aid the development of a new type of cancer therapy. The T cells possess a unique type of T cell receptor that can recognize several different types of cancer via a single HLA-like molecule called MR1. The newly discovered T cells were shown, in the lab, to destroy lung, skin, blood, colon, breast, bone, prostate, ovarian, kidney and cervical cancer cells – whilst leaving normal cells unharmed.

“If this transformative new finding holds up, it will lay the foundation for a ‘universal’ T-cell medicine, mitigating against the tremendous costs associated with the identification, generation and manufacture of personalized T-cells. This is truly exciting and potentially a great step forward for the accessibility of cancer immunotherapy,” – Prof. Awen Gallimore (https://www.cardi.ac.uk/people/view/78694-gallimore-awen), Cardiff University.

Starve a tumor, feed a cell

A team of biologists from University of California, Irvine, has been investigating a mechanism known as macropinocytosis that enables cancer cells to scavenge dead cell debris for amino acids, providing them with a source of nourishment. As well as providing the cells with amino acids, the team demonstrated that macropinocytosis provides the diseased cells with additional benefits, in the form of sugars, fatty acids and nucleotides for biosynthesis, conferring resistance to therapies targeting anabolic pathways.

“What we see is that blocking macropinocytosis can help us to treat many different cancers more effectively. This knowledge could enable better biomarker selection in clinical drug trials currently underway, leading to improved response to pharmaceutical combinations. It also provides a strong rationale for developing drugs that target and block macropinocytosis,” – Aimee Edinger (https://edingerlab.bio.uci.edu/lab/), UC Irvine School of Biology

Why is colon cancer more deadly in patients under 25 years?

Research conducted by scientists at The University of Texas MD Anderson Cancer Center found that colon cancer is more likely to be lethal in children and younger adults, compared to middle-aged adults. In the single-institution study, mortality rates were shown to persist regardless of whether pediatric, adolescent and younger adult patients (defined as ≤ 24 years old) were born with a predisposition for colon disease or anomalies.
“Children with colon cancer can fall through the cracks. They may be seen by an oncologist who treats adults but who doesn't know how to treat children. Or they may be seen by a pediatrician who knows all about treating children but nothing about colon cancer,” – Andrea Hayes-Jordan (https://www.med.unc.edu/surgery/pediatricsurgery/directory/andrea-hayes-jordan-md-facs-faap/), MD, FACS, lead author of the paper, and Surgeon-in-Chief of the North Carolina Children’s Hospital.

Published in: Journal of the American College of Surgeons (https://www.journalacs.org/article/S1072-7515(20)30167-8/fulltext)


How cannabinoids fuel growth of HPV-related head and neck cancer

Researchers from the University of California San Diego School of Medicine have uncovered the molecular mechanism that becomes activated by tetrahydrocannabinol (THC) – a phytocannabinoid found in the cannabis plant – that leads to accelerated cancer growth in patients diagnosed with human papillomavirus (HPV)-positive head and neck cancer. The presence of THC in the bloodstream activates the p38 MAPK signaling pathway. When activated, p38 MAPK inhibits apoptosis, thus enabling the uncontrolled growth of the diseased cells.

“We now have convincing scientific evidence that daily marijuana use can drive tumor growth in HPV-related head and neck cancer. Marijuana and other cannabis products are often considered benign, but it is important to note that all drugs that have benefits can also have drawbacks,” – Chao Liu, MD, visiting scientist at UC San Diego and a physician at China's Central South University.

Published in: Clinical Cancer Research (https://clincancerres.aacrjournals.org/content/26/11/2693)


Blood test can detect cancer four years before conventional methods

A non-invasive blood test has been developed that is able to detect whether a person has one of five common types of cancer (stomach, esophageal, colorectal, lung and liver) four years before the condition can be diagnosed with other diagnostic methods. The new blood works by interrogating cancer-specific methylation signatures.

“The ultimate goal would be performing blood tests like this routinely during annual health checkups, but the immediate focus is to test people at higher risk, based on factors,” – Kun Zhang (http://igm.ucsd.edu/faculty/profiles/kun-zhang.shtml), University of California San Diego.

Published in: Nature Communications (https://www.nature.com/articles/s41467-020-17316-z)


How carcinogens trigger breast cancer development
A team of scientists has created a detailed map that describes the many ways in which environmental chemicals can trigger the disease. Using ionizing radiation as a model, they were able to decipher key cellular mechanisms that, when interrupted, can cause breast cancer. As their findings can be generalized to other environmental carcinogens, they could help regulatory authorities identify chemicals that increase a person's risk of breast cancer.

“The study is important and highlights the need for a holistic consideration of mechanistic evidence when identifying potential carcinogens. In reality, there are multiple key characteristics of carcinogens. Increasingly, we are appreciating that human carcinogens may exhibit different combinations of these key characteristics,” – Kathryn Guyton (https://www.iarc.fr/staff_member/kathryn-guyton/), International Agency for Research on Cancer.

Published in: Archives of Toxicology (https://link.springer.com/article/10.1007/s00204-020-02752-z)

Cancer depends on biophysics to get started

Researchers have discovered evidence that cancer is prompted by disruption of the normal physical characteristics of the cell environment, which removes suppression on oncogenic genes. The process for initiation of cancer is termed “Load (with a gene variant) and Trigger (by a dysregulated biophysical environment)”. The research team has demonstrated that the rate of cell growth and the way the cells respond to anticancer therapeutics is altered by the landscape of the substrate cancer cells grow upon.

Published in: Cell Biochemistry and Biophysics (https://doi.org/10.1007/s12013-019-00888-z)