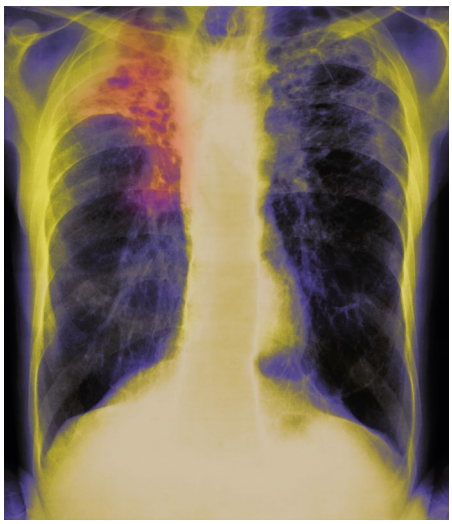
CLINICAL TRIALS

A vaccine for tuberculosis

N. Engl. J. Med. https://doi.org/10.1056/NEJMoa1803484 (2018).



Credit: Simon Fraser/Science Source

Results from a new tuberculosis (TB) vaccine tested in individuals with latent TB suggest that this vaccine delays or prevents progression to active TB.

Mycobacterium tuberculosis has infected 25% of the world's population, but there is no approved vaccine that prevents transmission of TB. Preventing reactivation of TB in individuals with latent infection would have a major impact on disease burden and spread.

A phase 2b placebo-controlled trial of a TB vaccine ($M72/AS01_E$) was conducted in three African countries and involved more than 3,500 HIV-negative adults with latent TB. After a mean of 2.3 years, the vaccine demonstrated 54% vaccine-mediated protection against TB reactivation.

The trial results may offer new insights into the development of a highly effective TB vaccine. *AF*

https://doi.org/10.1038/s41591-018-0258-5

CANCER IMMUNOTHERAPY

Biomarkers for checkpoint blockade

Science **362**, eaar3593 (2018).

In combination, tumor mutational burden and the immunological state of the tumor microenvironment predict clinical responses to programmed death–1 (PD-1) inhibition across tumor types.

Immune checkpoint–blocking antibodies have yielded unprecedented antitumor responses in patients; however this treatment is not effective in all patients, and biomarkers that predict clinical efficacy are lacking.

Razvan Cristescu et al. perform analyses of clinical samples from patients collectively diagnosed with 22 different tumor types who were enrolled in trials assessing the effect of the anti-PD-1 antibody pembrolizumab in patients with cancer. The combination of high tumor mutational burden and a gene expression program reflecting T cell activation predict the highest rates of response to PD-1 blockade.

This study provides clinically relevant biomarkers for predicting response to cancer immunotherapy. *JC*

https://doi.org/10.1038/s41591-018-0257-6

ENVIRONMENTAL HEALTH

Personalized tracking of exposure to airborne organisms and chemicals

Cell **175**, 277–291 (2018).

Using data from a wearable device that samples the air, researchers can monitor the organisms and chemicals that an individual equipped with the device is exposed to over the course of weeks or months.

Michael Snyder and colleagues tracked the airborne biological and chemical exposure—the 'exposome'—of 15 individuals for up to 890 days. The authors find that humans are exposed to thousands of biological species and that the personal exposomes across this set of individuals are highly diverse and are influenced by location and season.

This comprehensive cataloguing of individual environmental exposure to biological and chemical agents opens up a new perspective on the potential impact of the environment on human health. *MB*

https://doi.org/10.1038/s41591-018-0259-4

SUBSTANCE ABUSE

Analyzing the drug overdose epidemic in the United States

Science **361**, eaau1184 (2018).

Death by unintentional drug overdose is increasing exponentially in the United States, although several epidemics of different drugs underlie the pattern.

Understanding the public health crisis of substance abuse and drug overdose may facilitate the development and implementation of tailored prevention and treatment strategies.

Donald Burke and colleagues analyzed records of nearly 600,000 deaths from unintentional drug overdose in the United States from 1979 to 2016. They found that the total overdose mortality rate follows a smooth exponential curve and that the epidemic is likely to continue along this path. The subepidemics of different drugs exhibit distinct characteristics regarding time course, geographic hotspots and affected demographic groups.

Understanding the various factors, ranging from economic to sociological, that shape the trajectory of overdose deaths may shed light on the root cause of the epidemic. *KG*

https://doi.org/10.1038/s41591-018-0261-x

REGENERATIVE MEDICINE

Human skeletal stem cells identified

Cell **175**, 43–56 (2018).

Multipotent and self-renewing stem cell populations that contribute to skeletal formation and response to injury are identified in humans.

The precise identity and hierarchical organization of the nonhematopoietic stem cells that give rise to diverse skeletal tissue, such as bone, cartilage and stroma, has remained elusive, particularly in humans.

Mouse skeletal stem cells have previously been described. Now, researchers from Stanford Medicine describe a skeletal stem cell population isolated from human bone that is defined by a set of cell surface markers. When transplanted into rodents, these human skeletal stem cells exhibit self-renewal, possess multipotent potential to generate diverse skeletal tissues and undergo expansion in response to bone injury. *BB*

https://doi.org/10.1038/s41591-018-0260-y

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