Volume 632 Issue 8015, 04 April 2024

Cellular learning

Cancer cells have an unfortunate ability to evade therapies by adapting to hostile environments that threaten their survival. In this week's issue, Gustavo Ciriello and Elie Sanse examine the molecular mechanisms these cells use to cope with environmental stress. They propose that these mechanisms can be co-opted by normal cells to enable adaptive responses. Other underlying principles that govern regulatory combinations and using feedback responses to stabilize those combinations that restore stress levels. In particular, they suggest that this cellular adaptation can — show all

Cover image: Erzsébet Kovács.

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Stop the 'space race'—space exploration must be a shared human endeavour

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What China's Great Green Wall can teach the world

Efforts to boost tree cover and restore degraded land globally need better training and thinker to learn from failure.

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AI needs solid botanical data more than ever

By artificial intelligence revolution in biochemistry won't get its vertical human taxonomic expertise — and that's under threat.

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Why many fossil fuels won't fix the Iran energy crisis

Climate Monday technologies but the best way to survive rising inflation — and will get better and cheaper over time.

Gernot Wagner

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Microbial hockey: bacteria can spin a 'puck' but it's swimming

3D printed discs between a previously undiscovered feature of bacterial locomotion to power tiny motors.

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Electric vehicles can ride to the grid's rescue

Vehicle-to-grid technology, if installed properly, could allow vehicles to serve as back-up batteries.

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Your nose contains multitudes — of lung-lived immune cells

Nasal tissue-dwellers' cells that 'remember' a pathogen long after infection is past.

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Liquid or solid? Dobbrick droplets are both

High-speed cameras can observe the strange behaviour of a comstarch-water mixture.

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Massive budget cuts for US science proposed again by Trump administration

The 2025 budget proposal would slash payments for scientific publishing and reduce funding for many US institutions.

Max Kozlov, Dan Garisto & Edward Chen

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Female mice grow tumors after this simple DNA tweak

Small changes to the non-coding part of the genome may help rule it has determination.

Rachel Fieldhouse

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Motherhood derails women's academic careers — these data reveal how and why

Mothers in academia take an considerably more childcare-related responsibilities than do fathers.

Diana Kwon

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First photons from Artemis II: see stunning 'Earthset' and more

Images snapped during a fly-by capture a rare eclipse and unprecedented details of the far side of the Moon.

Alexandra Witze

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'It's a real shock': quantum computing breakthrough one imminent risks to cybersecurity

Two studies suggest that quantum computers could crack ubiquitous security keys and cryptocurrencies before the decades is over.

Davide Castelvecchi

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New drugs take aim at one of cancer's deadliest mutations

Medicines in the KRAS protein were once deemed 'undruggable'. Today, active, approximate one in the pipeline.

Heidi Ledford

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'Treasure trove' of antiviral proteins could inspire powerful molecular tools

The nascent field of AI-designed safer from bacteria to create medicines screening thousands of ancient defence proteins that could inspire powerful biotechnologies

Miryam Naddaf

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The ape in full of DNA — here's what scientists are using it for

Airborne genetic material can be used to paint a picture of ecosystem health, search for invasive species and even identify humans.

Ashley Smith

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Scientists invented a fake disease. AI still swore it was real

Bizarreness doesn't even except in a clutch of obviously bogus academic papers. It's why AI chatbots can't people about the fictional illness?

Chris Stokel-Walker

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The 'crazy-rule-defying' genes that determine sex

A gripping account reveals the workings of the remarkable chromosome that specify male or female development.

Michael A. Goldman

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Can China's Great Green Wall chase efforts to keep the world's deserts at bay?

Vast-scale afforestation schemes often fail when trees die as it develop drive up — just one project has beaten the trends.

Lilin Zhang, Xinran Lian Zhu, ... Ruishan Chen

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Deep-sea mining: master's as about until there are baseline data

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China discontinues prominent journal ranking list

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Stop overlooking librarians' expertise

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AI agents replicate human social dynamics in days

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14 things one PhD supervisors got right and why it mattered

PhD students reflect on how their supervisors made a meaningful difference — from quiet acts of kindness to career-shaping guidance.

Linda Nordling

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Remembrance of inflammations past

Chronic inflammation increases the risk of colon cancer. The inflammation drives epigenetic changes in the nucleus of stem cells that promote tumour formations.

Changqing Qu & Jay Shendure

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AI speeds up design of devices that turn waste heat into electricity

An artificial intelligence system bypasses complex equations to predict the performance of thermoelectric generators.

Ying Cai & Lilia Tolstedt

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A gene-editing method generates immunotherapeutic CAR T cells in the body

Laboratory-engineered immune cells called CAR T cells provide effective treatment for some cancers. Progress is being made towards creating these cells in vivo.

Robert Hart & Jason Pizzo

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Bad confidence: LLMs can transmit malicious traits using hidden signals

A large language model that is trained using AI outputs can inherit undesirable behaviours, even if they are not directly referenced in the training data.

Cesar J. Hernandez & Samuel Bauer

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Quirky tissue patrolling attracts rule-breaking enzymes to destroy microRNAs

MicroRNAs control gene expression by modulating the amount of messenger RNAs. Here we have crucial regulators kept in check.

Katherine Mcmullen

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The striking history of safety matches

The search to make fire-lighting less dangerous and spread fire-inhabit part of information worth photocopying. In our weekly dip into Nature's archive.

Peter Bojcsin, Timon Hilker, ... Thue Fiano

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Protected quantum gates using qubit doublons in dynamical optical lattices

A purely geometric two-qubit CNOT gate can be realized by transiently populating qubit-doublon states of fermionic atoms in a dynamical optical lattice.

Yann Kiefer, Zijie Zhu, ... Tilman Esslinger

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Language models transmit behavioural traits through hidden signals in data

During model distillation, large language models can subtly transmit traits unnoticed to the training data.

Alex Cloud, Minh Le, ... Owain Evans

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Angle evolution of the superconducting phase diagram in twisted bilayer WSe2

Angle-resolved measurements of twisted WSe2 reveal conducting with sharp angle and energies apart from a deep reconstruction, hinting permanently distinct phase diagram and the Mott insulator.

Yinjie Guo, Jonas Richter, ... Cory R. Dean

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Superconductivity and electronic structures of nickelate thin film superstructures

Engineered Ruddlesden–Popper nickelate thin films with fourth-layer sulfate features enable enhanced pressure superconductivity, tuning structural configuration, electronic structure and superconducting behaviour.

Zhan Yan, Huaning Li, ... Zhongxu Chen

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Dual-symmetry gapbit assembly of cosmolex junctions

A dual-symmetry gapbit strategy is used to assemble a broad class of complex Archimedean lattices and two-dimensional quasicrystalline structures, providing a general and experimentally accessible route to complex symmetry materials.

Huang Yang, Xiaohan Li, ... Peng Yan

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Commonplace neural emulators accelerate thermoelectric generator design

Neural emulators can accelerate the design of thermoelectric generators by predicting the ability to predict generator performance with 1000 times faster while retaining accuracy that is comparable to conventional finite-element solvers.

Alvar J. Alcalá Ma, ... Teresa Alvar

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Maximizing carrier extraction in bi-hybrid back-contact silicon solar cells

Hybrid back contact silicon solar cells using a thin layer for both passivating and extraction enable the use of a thicker absorber, outperforming the 125-µm-thick silicon heterojunction devices, with a certified efficiency of 27.62%.

Zhong Zheng, Rui Ying, ... Hui Yan

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Imaging interface controlled bulk oxygen spillover

In situ microscopic single-particle imaging demonstrates the significance of externally engineered metal–support interfaces for activating the oxygen in bulk oxides, boosting oxygen reaction pathways in catalytic conversions.

Weiyue Wang, Hongbin Xu, ... Tao Zhang

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Alcohol group migrations by proximity-enhanced H atom abstraction

An existing method enables the migration of alcohol functional groups to previously inaccessible soft carbon/hydrogen sites—and stereochemical outcomes.

Qian Xu, Yichao Fan, ... Alison E. Wendlandt

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Sea level much higher than assumed in most coastal hazard assessments

Many analyses set a global scale sea level that is substantially lower than we have it higher than assumed in most coastal hazard assessments.

Katharina Seeger & Philip J. J. Winkelvoet

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Phenome-wide analysis of copy number variants in 470 721 UK Biobank genomes

A multidomestic phenome-wide analysis of copy number variants in the 470 thousand genomes increases power to detect genetic associations with complex traits across human populations.

Xuebing Cai, Eric Yongyuan Hu, ... Hehir Cara

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Coral microbiomes as reservoirs of unknown prokaryotic and bionetworks diversity

Reconstructing microbial genomes from 320 reef-building corals collected at 39 reefs across 32 islands throughout the Pacific Ocean highlights the importance of conserving coral reefs as vital reservoirs of microbial diversity.

Katarzyna Wodarkiewicz, Lucas Rock, ... Simonia Iacoppini

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Annual temperature environmental cues to reproduce matrotrophy behaviour

Annual temperature environmental cues to reproduce matrotrophy behaviour in poeciliid livebearing fishes are associated with placental genes involved in gene silencing and negatively associated with care, and independent of signal cues and mechanisms of placentation in previously known taxa.

Farrell Dylan Rogers, Sidney Kim, ... Catherine Jessen Peck

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RTA is a GPR88 receptor that drives MASH

MASH is driven by the activation of RTA88 receptors in mice and in vivo, leads to exacerbate MASH-driven and prevents lipid uptake and lipogenic programs, blocking the GPR88–RTA axis prevented and treated MASH in preclinical models.

Yue N. Wenxi Ding, ... Nan-Jung Song

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In vivo site-specific engineering in reprogram T cells

Stable and cell-specific transgene expression can be achieved throughout in vivo site-specific integration of large DNA payloads using a two-vector system of engineered delivery vehicles and adeno-associated viruses.

Mikkel A. Nyberg, Pierre-Louis Bernard, ... Isabel Aznauri

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SLAMF6 is a stress-targetable suppressor of T cell immunity against cancer

SLAMF6 functions immunotoxicity in T cell inhibitory, which is triggered by its homotypic interaction.

Ren J. Ning-Chun Zhang, ... Kristin Widdey

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Risk adaptive therapy guided by dynamic ctDNA in nasopharyngeal carcinoma

Risk adaptive therapy guided by dynamic ctDNA in nasopharyngeal carcinoma has the potential to de-escalate treatment without harm to short-term decisions about an individual's subsequent therapeutic progression-free survival by results.

Jiawei Li, Dan-Xia Zhang, ... Ying Sun

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ORC1L53-GPCR engineering boosts CAR-NK therapy against solid tumours

The identification of a receptor that drives post-transcriptional silencing of a CAR construct provides a simple and scalable strategy for developing effective CAR-NK cell therapies for solid tumours.

Lucas Yang Tsai K. Ramyar, ... Jun Chen

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Homologous recombination deficiency and homologously-drive resistance in breast cancer

Germline and somatic interactions define actionable genomic patterns driving acquired therapy resistance in breast cancer.

Ariane Salvatore, Minnie Hua, ... Rashmi Pharm

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Androgen activity in the male embryonic hindbrain drives lethal PFA sexual response

Androgen activity in the male embryonic hindbrain prolongs hindbrain differentiation in male individuals and drives sex differences in the incidence and progression of posterior fossa type A PFA tumorigenesis as determined in male and female mouse models.

Jiao Zhang, Winnie Ding, ... Michael D. Taylor

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Epigenetic memory of colitis promotes tumour growth

Epigenetic memory of colitis promotes tumour growth in mice and there is a bioinformatic link between chronic inflammation and malignancy, suggesting potential strategies to target cancer risk in patients with chronic inflammatory conditions.

Sunyi Nagashige, Lely Gayle Wilson, ... Jason D. Buenrostro

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The L1 stabilizer kinase mechanism specifying targeted microRNA degradation

Target-directed microRNA degradation is a conserved mode of microRNA (TDMD) regulation. Kinase-dependent TDMD activation mechanism to specifically recognize ADD-miRNA-trigger RNA complexes and polycistronic NUDT.

Mehdi Fanning, Elena Bartolomeyuk, ... David P. Bartel

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Non-equilibrium assemblies of bisantrafenib at the α-amino receptor

Time-resolved cryo-electron microscopy of a potential receptor bound to various ligands enables a detailed look at the mechanisms that underlie GPCR-induced activation of G proteins and how different ligands affect activation kinetics.

Michael J. Robertson, Ariele Meidal, ... Georgios Skiniotis

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Scaffolding of the dynamic basis of NTCELC promotes subgroup promiscuity

Scaffolding of the dynamic basis of NTCELC promotes subgroup promiscuity NTCELC enables isolation of multiple transient complexes along the structure pathway and shows how the interface flexibility promotes.

Alma A. Ito, Arnab Mondal, ... Michael J. Robertson

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The dynamic basis of G protein recognition and activation by a GPCR

Conventional and time-resolved cryo-electron microscopy reveal how NTSR1 activation engages and releases different G proteins, capturing nine GI intermediates and uncovering key mechanistic steps in GDP- and GTP-driven activation, subtype selectivity and distinct dissociation pathways.

Kazuma Kimura, Norah Kowalewski, ... Hideaki E. Kato

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Author Correction: Phenome-wide analysis of copy number variants in 470 721 UK Biobank genomes

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Author Correction
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Author Correction: Signatures of ambient pressure superconductivity in thin films La2CuO4

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