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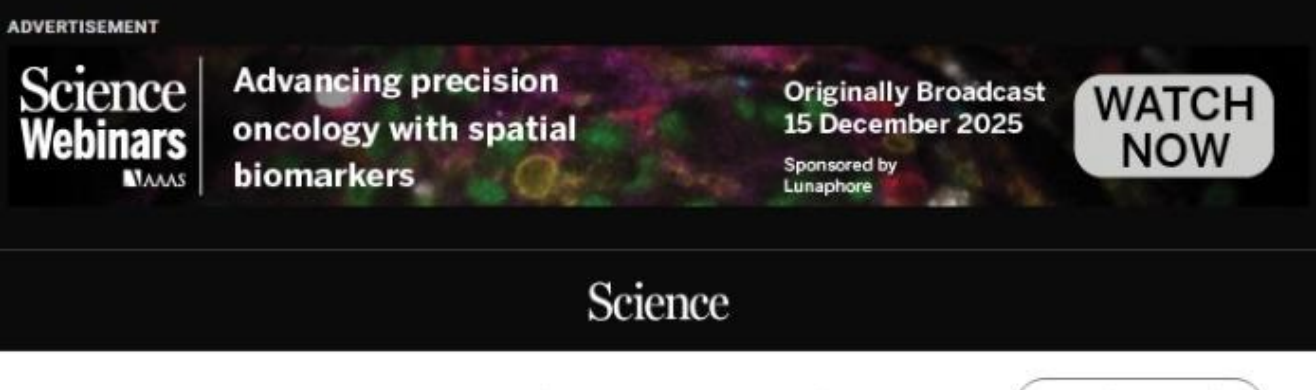
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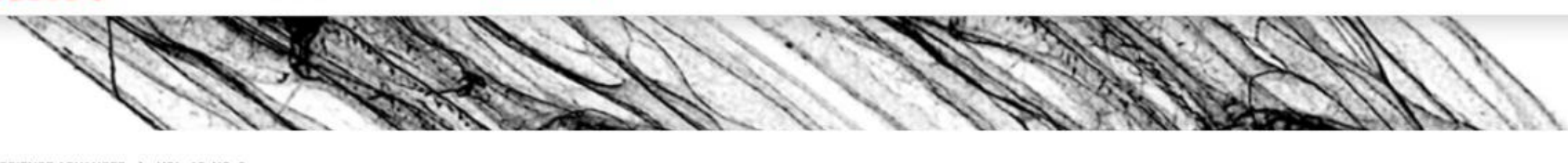

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Forest loss increases the risk of meteorological drought more in boreal zones than in the tropics.

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Mitigating extreme fire weathers across the globe demands aggressive CO_2 removal strategies beyond net-zero emissions.

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BY JUHA AALTO, MATTI KÄMÄRÄINEN, MIKA RANTANEN, PEKKA NIITTYNEN, GARETH K. PHOENIX, JONATHAN LENOIR, ILYA MACLEAN, MISKA LUOTO 07 JAN 2026

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Sponges have a cryptic Ediacaran history because ancestral sponges were soft-bodied and had low fossilization potential.

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Evidence for hydroperoxide formation through atmospheric aqueous photochemistry of α-keto acids

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Sunlight irradiation of α-keto acids leads to the formation of hydroperoxides in cloud, rain, and aerosol waters.

ABSTRACT

Combined effects of photorespiration and fire strongly regulate atmospheric oxygen levels

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Interactions between wildfire and photorespiration under high O_2 strongly regulate Earth's atmospheric oxygen levels.

ABSTRACT

Seismicity diagnostic of permeability creation from centimeter to subkilometer scales in crystalline rock during shear stimulation

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Microearthquakes remotely diagnose the evolution of permeability in the Earth's crust.

ABSTRACT

Improved air-sea CO_2 flux estimates from sailboat measurements

BY JACQUELINE BEHNCKE, TATIANA ILYINA, FATEMEH CHEGINI, PETER LANDSCHÜTZER • 09 JAN 2026

Citizen science enables continuous sailboat sampling during global races, improving carbon uptake estimates in remote oceans.

ABSTRACT

Abundance of microplastics and nanoplastics in urban atmosphere

BY TAFENG HU, CHONGCHONG ZHANG, YUQING ZHU, JING DUAN, SUIXIN LIU, NIU JIN, YINGPAN SONG, FENG WU, JIANJUN LI, TING ZHANG, [...] DAIZHOU ZHANG +7 authors • 07 JAN 2026

A semiautomated microanalysis approach to quantify atmospheric plastics and their cross-compartmental flux in two megacities.

ABSTRACT

Genomic adaptation strategies to habitat switching in Korarchaeota

BY LEI SU, ANDREAS P. TESKE, IAN P. G. MARSHALL, ZICHAO ZENG, YINZHAO WANG, KURT O. KONHAUSER, YUHAO LI, SHENGWEI HOU, JIANGTAO LI • 09 JAN 2026

The adaptation of Korarchaeota across changing habitats tracks their coevolution with Earth throughout its dynamic history.

ABSTRACT

Mapping life's disparity and evolutionary constraints in a geometric complexity space

BY GUILLAUME DERA, ELISE NARDIN, LAURENT RISSER, MARIUS ALBINO, QUENTIN GARNIER, MARION KARDACZ, LÉA MONGE-WALERYSZAK • 07 JAN 2026

Life's diversity is limited to a small set of shapes due to fundamental physical and evolutionary constraints.

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First submillimeter lights from Dome A: Tracing the carbon cycle in the feedback of massive stars

BY YAN GONG, JIAQIANG ZHONG, YUAN REN, YILONG ZHANG, DAIZHONG LIU, YIPING AO, QIJUN YAO, WEN ZHANG, WEI MIAO, ZHENHUI LIN, [...] JING LI +30 authors • 07 JAN 2026

First submillimeter maps from Antarctica's Dome A reveal how massive stars power the cosmic carbon cycle.

ABSTRACT

Mass extinction triggered the early radiations of jawed vertebrates and their jawless relatives (gnathostomes)

BY WAHEI HAGIWARA, LAUREN SALLAN • 09 JAN 2026

A mass extinction 445 million years ago triggered the rapid rise of armored and jawed vertebrates.

ABSTRACT

Arboviruses manipulate rice's volatile emissions, protecting insect vectors from natural enemies in the field

BY QING LIU, QIAN WANG, QIONG LI, WEIRAN WANG, QI LI, ZIYUAN PENG, YULING JIAO, FENG CUI, IAN T. BALDWIN, XIAOMING ZHANG • 07 JAN 2026

Rice viruses modify plant volatiles to protect insect vectors from natural enemies.

ABSTRACT

PHYSICAL AND MATERIALS SCIENCES

Molecular computation at equilibrium via programmable entropy

BY BOYA WANG, CAMERON CHALK, DAVID DOTY, DAVID SOLOVEICHIK • 09 JAN 2026

The entropic drive to maximize the molecular count can generate a variety of complex programmable behaviors in DNA nanotechnology.

ABSTRACT

High-performance n-type flexible inorganic thermoelectric aerogel for energy harvesting

BY XIAODONG WANG, WENBO ZHU, YIJIE LIU, SHUAIHANG HOU, LI YIN, JINXUAN CHENG, PENG ZHAO, FENG JIANG, SICHEN DUAN, WENHUA XUE, [...] QIAN ZHANG +5 authors • 09 JAN 2026

A two-step synthesis method was proposed to construct an n-type Ag_2Se aerogel with record-high thermoelectric performance.

ABSTRACT

Disaggregated machine learning via in-physics computing at radio frequency

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A disaggregated in-physics computing architecture uses radio-frequency waves and mixers for machine learning at the wireless edge.

ABSTRACT

Ultrapliable bioelectronic interface for mechanosensitive cardiac electrophysiology

BY JING YU, ZHI JIANG, MATTHEW ACKERS-JOHNSON, GUIJIN ZOU, FEILONG ZHANG, MING ZHU, CAN CAO, JIAOFU LI, PRASANNA VIDYASEKAR, WENLONG LI, [...] XIAODONG CHEN +8 authors • 07 JAN 2026

Minimizing mechanical mismatch, a 10-kPa device enables precise and durable cardiomyocyte signal monitoring.

ABSTRACT

Three-component synthesis of β-thio tertiary alkylamines from simple alkenes via S_H2 homolytic substitution

BY HONGYU WANG, TING WANG, YANG LI, QIANYU HE, WENXUAN MA, XINYU GUAN, YIFEI LI, YONGLI BAO, YONGYUN ZHAO, QIAN ZHANG, [...] JUNKAI FU +2 authors • 09 JAN 2026

Three-component aminothiolation of simple alkenes is reported to construct β-thio tertiary alkylamines via an S_H2 mechanism.

ABSTRACT

Self-reconfigurable robotic fish swarms: Collective achievement of diverse locomotion and challenging aquatic tasks

BY BOWEN SI, LIYAO CHANG, SHUAI LI, ZHENYU DING, GUANGMING XIE • 09 JAN 2026

Modularity enhances robotic fish swarm locomotion and enables adaptation to diverse aquatic environments and challenging tasks.

ABSTRACT

NIR-switched DNA tweezer enables reversible miRNA recognition with erasable signal for in vivo continuous imaging

BY CAIXIA WANG, YULIN CONG, LINLIN YANG, LIANG LIU, YUXIN XIE, XUAN DING, GUIXIANG ZENG, HUANGXIAN JU, YING LIU • 09 JAN 2026

A DNA tweezer is switched between "open/closed" statuses by different NIR exposure powers for in vivo reversible miRNA detection.

ABSTRACT

Efficient lead-free antimony halide light-emitting diodes with 22% external quantum efficiency via a binary host-guest architecture

BY JINYANG LI, KELE LIAO, JIAJIA ZHANG, FANGLONG YUAN • 09 JAN 2026

Efficient lead-free antimony halide light-emitting diodes via a binary host-guest architecture are reported.

ABSTRACT

Programmable polariton canalization in reconfigurable metasurfaces

BY YANG XU, XIAOQIANG SU, FUSHENG DENG, YUQIAN WANG, YAPING YANG, PABLO ALONSO-GONZÁLEZ, HONG CHEN, JIAFANG LI, JIAHUA DUAN, ZHIWEI GUO 09 JAN 2026

The polariton canalization can be programmed along any desired in-plane direction in reconfigurable metasurfaces.

ABSTRACT

Scalable nanoconfined ionic liquid membranes with ultrapermeance and ultraselectivity for efficient CO_2 capture

BY FAN WANG, DINESH KUMAR BEHERA, BRATIN SENGUPTA, DAVID LI, MIAO YU • 07 JAN 2026

Scalable nanoconfined ionic liquid membranes enable one-step CO_2 enrichment to 98%.

ABSTRACT

A general soft robotic controller inspired by neuronal structural and plastic synapses that adapts to diverse arms, tasks, and perturbations

BY ZHIQIANG TANG, LIYING TIAN, WENCI XIN, QIANQIAN WANG, DANIELA RUS, CECILIA LASCHI • 07 JAN 2026

A machine learning–driven control framework empowers generalizable and adaptive capabilities for soft robots.

ABSTRACT

Whole-brain meso-vein imaging in living humans using fast 7-T MRI

BY OMER FARUK GULBAN, RÜDIGER STIRNBERG, DESMOND HO YAN TSE, ALESSANDRA PIZZUTI, KENSHU KOISO, MARIO EDUARDO ARCHILA-MELENDEZ, LAURENTIUS (RENZO) HUBER, SASKIA BOLLMANN, RAINER GOEBEL, KENDRICK KAY, DIMO IVANOV • 09 JAN 2026

In vivo 7-T MRI maps the entire human brain's veins at high resolution in minutes.

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Nyquist–Hilbert–nonlinear Schrödinger solitons: A continuous family of fractional nonlinear waves

BY VAN THUY HOANG, Y. LONG QIANG, TRISTRAM J. ALEXANDER, ANTOINE F. J. RUNGE, C. MARTIJN DE STERKE • 09 JAN 2026

Fractional derivatives give rise to nonlinear soliton waves with designer properties.

ABSTRACT

Bioinspired cross-medium wall-climbing robot with high-performance adhesion and contact adaptability

BY HAORAN LIU, HONGMIAO TIAN, ZEXI ZHENG, HUIMING LIU, HECHUAN MA, ZHIHAO DENG, DUORUI WANG, JINYU ZHANG, XIANGMING LI, XIAOLIANG CHEN, [...] JINYOU SHAO +3 authors • 07 JAN 2026

A cross-medium wall-climbing robot expeditiously crawls on uneven vertical and inverted surfaces in multimedia environments.

ABSTRACT

β-Carbon functionalization of amines via α-amino Cu-carbenes

BY RUI QIN, WEI-FANG ZUO, ZE-HONG ZHENG, JIN ZHOU, JIA-XIN LI, GEN ZHOU, HAO HUANG, YAN-RONG WEI, CHENG PENG, QIAN-QIAN YANG, BO HAN 09 JAN 2026

Leaving group–driven pyrrole α-amino Cu-carbene generation enables divergent β functionalization of amines via carbene insertion.

ABSTRACT

Highly efficient α-sialylation with *ortho*-(1-phenylvinyl)benzoates as leaving groups: One-pot assembly of α-sialoglycans

BY YUNQIN ZHANG, YUJIE JI, QIANG TAN, HANYINGZI FAN, QINGLI ZHOU, CAIXIA YIN, SIQI LI, XIUFANG WANG, GANG LU, GUOZHI XIAO • 09 JAN 2026

Streamlined one-pot assembly of various α-sialoglycans has been achieved using sialyl *ortho*-(1-phenylvinyl)benzoates.

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Anode-induced arylthiol-amine cross-coupling: A nontraditional strategy to access sulfinamides

BY PAN ZHOU, TING ZOU, SEN-HUI WU, HONG-JIAN SONG, YU-XIU LIU, QING-MIN WANG • 09 JAN 2026

An electrocatalytic approach to synthesize sulfinamides by cross-coupling arylthiols and aliphatic amines.

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Enantioselective rapid assembly of bis-heterocycles by sequential palladium-catalyzed aza-Heck cyclization coupling reaction

BY LEI WANG, SHUAIJIE WU, WENYU ZHANG, SHUTING ZHANG, JIEYA DONG, WEIMING HU, CHENGCHENG ZHOU, LIUZHOU GAO, LIEJIN ZHOU, JUNLIANG ZHANG 09 JAN 2026

Enantioselective synthesis of isoindolinone linked benzofuran/indole by Pd-catalyzed aza-Heck cyclization coupling reaction.

ABSTRACT

Programmable electric tweezers

BY YUANG CHEN, HAOJING TAN, JIAHUA ZHUANG, YANG XU, CHEN ZHANG, JIANDONG FENG • 09 JAN 2026

Programmable electric tweezers programs local electric field to achieve function-on-demand single-object manipulation.

ABSTRACT

BIOMEDICINE AND LIFE SCIENCES

Developmental regulation of Erk signaling by mitotic kinases

BY FEI CHEN, JAN M. BRUDER, NIRAIMATHI GOVINDASAMY, JIE WU, RUI CHEN, DEVILA PRIT, HANNES C. A. DREXLER, SEBASTIAN A. LEIDEL, HANS R. SCHÖLER, IVAN BEDZHOV • 09 JAN 2026

The mitotic kinases aurora A and polo-like kinase 1 act as cell-intrinsic regulators of Erk signaling in pluripotent stem cells.

ABSTRACT

STING stimulation via supramolecular prodrug hydrogel boosts innate-adaptive immune cross-talk to prevent glioblastoma recurrence

BY QI SHANG, CHENWEI JIANG, MINGMEI GUO, MINGLU TANG, JIAPEI YANG, JUNJIE XIE, XIAORAN AN, QIANG ZHANG, FEIHU WANG • 07 JAN 2026

A STING agonist–incorporated prodrug hydrogel activates innate and adaptive immunity to prevent GBM recurrence postresection.

ABSTRACT

Nat10-mediated ac4C epitranscriptomics orchestrates hematopoietic stem/progenitor cell fate determination via translation control

BY FENG HUANG, YUSHUAI WANG, WEIWEI GAO, XIUXIN ZHANG, JIAJIA ZHOU, YING YANG, HONGJIE MO, MINHAN WANG, QI CHEN, GUANGDUN PENG, [...] HENGYOU WENG +2 authors • 07 JAN 2026

ULAC-seq mapping of the hematopoietic hierarchy reveals dynamic ac4C deposition by Nat10 as essential for HSC self-renewal.

ABSTRACT

Nectin-4 PET for predicting enfortumab vedotin dose-response in urothelial carcinoma

BY AKHILESH MISHRA, AJAY KUMAR SHARMA, KULDEEP GUPTA, DHANUSH S. BANKA, BURLES A. JOHNSON, JEAN HOFFMAN-CENSITS, PENG HUANG, DAVID J. MCCONKEY, SRIDHAR NIMMAGADDA • 07 JAN 2026

Real-time PET imaging of Nectin-4 interactions unlocks tailored dosing strategies for precision cancer therapy.

ABSTRACT

Linear ubiquitination triggers Amph-mediated T-tubule biogenesis

BY KOHEI KAWAGUCHI, YUTARO HAMA, HARUNORI YOSHIKAWA, KOHEI NISHINO, KAZUKI MORIMOTO, TSUYOSHI NAKAMURA, MICHIKO KOIZUMI, YURIKO SAKAMAKI, KOTA ABE, SOICHIRO KAKUTA, [...] NAONOBU FUJITA +3 authors • 07 JAN 2026

Linear ubiquitination-driven puncta assembly on membranes triggers Amph-mediated T-tubule biogenesis in muscle cells.

ABSTRACT

A distinct subset of stem-cell memory is poised for the cytotoxicity program in $CD4^+$ T cells in humans

BY RAUNAK KAR, SHREYA SINHA, ZAINAB KHATUN, ANJALI SHARMA, VEENA S. PATIL • 07 JAN 2026

A subset of $CD4^+$ memory T cells is indistinguishable from memory $CD8^+$ killer T cells, which find their origin in stem-cell memory.

ABSTRACT

CXCR5 identifies stem-like resident memory $CD8^+$ T cells enriched for latent EBV specificity in tonsils

BY OLGA RIVERA BALLESTEROS, LISA RIEBLE, CURTIS CAI, TAKUYA SEKINE, VERA NILSÉN, SARAH ADAMO, THOMAS R. MÜLLER, CHRISTIAN CONSTANTZ, JULIA NIESSL, EOGHANN WHITE, [...] MARCUS BUGGERT +19 authors • 07 JAN 2026

$CXCR5^+$ memory $CD8^+$ T cells in tonsils show stem-like resident traits and enrich for latent EBV antigen specificity.

ABSTRACT

Mouse digit AAV gene delivery into fibroblasts regulates regenerative outcome

BY VIVIAN JOU, SCOTT D. SEMELSBERGER, JACK SMERCZYNSKI, JESSICA A. LEHOCZKY • 07 JAN 2026

AAV delivery of putative proregenerative genes into proximal, nonregenerative mouse digit fibroblasts induces regeneration.

ABSTRACT

The Yeh pilus adhesin is equipped with an α-helical flap motif, which contributes to pectin adherence

BY KEVIN O. TAMADONFAR, ROGER D. KLEIN, EDWARD D. B. LOPATTO, MAXWELL I. ZIMMERMAN, PHILIPPE N. AZIMZADEH, DENISE A. SANICK, JUSTIN R. PORTER, JESUS BAZAN VILLICANA, JEROME S. PINKNER, BO HUEY CHIANG, [...] SCOTT J. HULTGREN +5 authors • 07 JAN 2026

YehD and YhlD are α helix–containing bacterial adhesins; the former adheres to pectin and mediates bacterial GI colonization.

ABSTRACT

ERα activates NAMPT/IL-33 signaling to enhance beige thermogenesis and metabolic fitness

BY RUOCI HU, JOOMAN PARK, YANYU QIAN, SHAOLEI XIONG, AHMAD HAMZA ELSABBAGH, ADITYA CHHIKARA, HUAILING FAN, ZUOXIAO SHI, LIFENG LIU, YANHUI LI, [...] YUWEI JIANG +10 authors • 07 JAN 2026

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ABSTRACT

Control of airway basal stem cell–mediated lung repair by TGF-β signaling

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Smart basal stem cells sense TGF-β and release BMP7, enhancing lung repair and reducing fibrosis.

ABSTRACT

3D organotypic skin models recapitulate autoantibody-driven pemphigus pathomechanisms and targeted therapeutic response

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Biofabricated 3D skin architectures recreate autoimmune microenvironments for quantitative evaluation of targeted therapies.

ABSTRACT

Self-transforming hydrogel mimicking tertiary lymph nodes to activate cGAS-STING pathway for enhanced antitumor immunotherapy

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Mimetic tertiary lymph nodes offer a promising option for tumor immunotherapy.

ABSTRACT

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A thermodynamical model predicts the output of an enhancer in vivo upon modulation of a transcription factor binding site.

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Developmental transcription factors display a range of targeting H3K9me3 heterochromatin to open chromatin, for cell fate changes.

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Friction-driven scission: How nonlocal mechanisms contribute to membrane fission across domains of life

BY ANE LANDAJUELA, CAROLINA GOMIS PEREZ, PATRICIA BASSEREAU, ANDREW CALLAN-JONES, ERDEM KARATEKIN • 07 JAN 2026

A membrane fission mechanism uses a membrane tension gradient and a protein scaffold that hinders the associated membrane flow.

ABSTRACT

Allospecific splenic Tr1 cells drive effector T cell exhaustion through up-regulated Areg-EGFR signaling to promote transplant tolerance

BY AMAR SINGH, ADAM HERMAN, DEVANJAN DEY, SAMUEL MENGE, SHILPI SINGH, ANNA TRAN, ANDERS MATSON, AHMED MOURAD, PARTHASARATHY RANGARAJAN, RAVI MASURIA, [...] BERNHARD J. HERING +6 authors • 07 JAN 2026

Splenic $Areg^+$Tr1 cells promote tolerance by inducing $CD4^+$ T cell exhaustion and metabolic suppression via Areg-EGFR signaling.

ABSTRACT

Impaired nitrogenous waste clearance promotes hepatocellular carcinoma

BY XINLU HAN, JIANLIANG SHEN, JUNRONG YAN, RAHUL TACKE, WEIWEI DAI, QINGQING MAO, HEINEKEN QUEEN DAGUPLO, SHUYANG LIU, ARIFUL ISLAM, TONG LIU, [...] WEI-XING ZONG +11 authors • 09 JAN 2026

Dietary protein restriction attenuates HCC growth.

ABSTRACT

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