proteins that play crucial roles in numerous cellular activities. ACD is exceptionally potent, even though its substrate is the most abundant protein of a eukaryotic cell: actin. — SMH

**CALCIUM CHANNELS**

**One gene for three calcium currents**

Mammals produce alternative forms of the Orai1 protein, which forms the pore of various calcium channels. This involves using two different translation initiation start sites in the encoding transcripts. Desai et al. showed that these long and short forms produce calcium channels with distinct properties. Both forms can participate in two kinds of channels that respond to the depletion of calcium from internal stores. However, only the long form contributes to a channel that is activated by arachidonic acid and leukotriene C4, lipids that promote inflammation. Thus, alternative translation initiation of the Orai1 message produces at least three types of calcium channels with distinct signaling and regulatory properties. — NRG


**HIV**

**How antibodies mature**

Antibodies are stalwart protectors against infection, but even they need a little help from their friends. Through a process called affinity maturation, T follicular helper (Tfh) cells guide B cells to produce antibodies with improved specificity to a particular pathogen. Now Yamamoto et al. report that in nonhuman primates, the frequency and quality of Tfh cells were associated with the development of broadly neutralizing antibodies that might be protective against simian HIV. These findings suggest that HIV vaccines that incorporate Tfh cell stimulation could boost broadly neutralizing antibody production. — ACC


**METABOLISM**

**S-nitrosylation links obesity and cell stress**

Obesity and other diseases are somehow linked to malfunction of the protein-protecting functions of the endoplasmic reticulum (ER). Yang et al. propose a mechanism by which obesity and associated chronic inflammation may be linked to the accumulation of unfolded proteins in the ER. Such stress would normally trigger the process known as the unfolded protein response (UPR). However, obese mice had increased S-nitrosylation of inositol-requiring protein-1 (IRE1α), a ribonuclease that regulates the UPR. The modified IRE1α had decreased RNase activity. The authors expressed an IRE1α mutant protein that could not be nitrosylated in the liver of obese mice. This approach improved the UPR and helped restore glucose homeostasis. — LBR

*Science*, this issue p. 500

**IN OTHER JOURNALS**

Edited by Sacha Vignieri and Jesse Smith

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**INNATE IMMUNITY**

**Innate lymphoid cells to the rescue**

Most people enter the hospital with the hope of getting better, but recent increases in hospital-acquired infections have made hospitals deadly in their own right. For instance, deaths caused by the enteric bacterium *Clostridium difficile* increased by 400% in the last decade. *C. difficile* is an opportunistic pathogen that takes advantage of disruptions in the microbiota caused by antibiotic treatment. Abt et al. provide new insight into how the host defends itself against this unwelcome intruder. Studying *C. difficile*-infected mice, the authors found that the mice required innate lymphoid cells (ILCs) to survive the infection. ILCs did not substantially contribute to reducing pathogen burden but instead appeared to limit pathology and systemic dissemination. — KLM

*Cell Host Microbe* 18, 27 (2015).

**SIGNAL TRANSDUCTION**

**Signaling probed by single-molecule tracking**

Developmental signaling through the so-called Hedgehog pathway is transduced through the receptor-like protein Smoothened. Hedgehog signaling requires highly specific localization of Smoothened in target cells at the primary cilium, a structure that functions somewhat like an antenna to receive and transmit signals. Milenkovic et al. tracked movement of single molecules of Smoothened in the cilia of cultured mouse embryo fibroblasts. Movement of Smoothened was restricted by binding events at the base of the cilium. Activation of Hedgehog signaling decreased the affinity of such binding. Such regulated binding of Smoothened to its yet-to-be-defined partner(s) within the cilium is likely an important step in the Hedgehog signaling mechanism. — LBR


**NEUROSCIENCE**

**At the center of our own spatial social network**

Neurons in the hippocampus...
Allowing faults out of lock-up

The crust around a locked, earthquake-prone fault responds to the two sides pulling in opposite directions by bowing and bulging over time. Meltzner et al. and Wesson et al. challenge a common assumption that this deformation progresses mostly in a uniform, linear way. Deformation shows up in seafloor bathymetry, which changes abruptly for both Sumatra and Isla Santa Maria, Chile, over a seismic cycle. Periods during which the fault is weakly locked explains the non-uniform behavior. Quantifying the effect clarifies subduction zone mechanics, which may require updating estimates of earthquake hazard. — BG

Quat. Sci. Rev. 10.1016/j.quascirev.2015.06.003 (2015);
Nat. Geosci. 10.1038/ngeo2468 (2015).

NUCLEAR CHEMISTRY

Subsurface corrosion of uranium

Uranium dioxide, the most common form of nuclear fuel, becomes mobile as it oxidizes. Although oxidative corrosion is inherently a surface-mediated process, interstitial oxygen atoms can induce oxidation many atomic layers deeper. By detailing the surface structure and composition of UO₂, after exposure to oxygen in air and water, Stubbs et al. show that oxidation does not follow a classical diffusion pattern. Instead, interstitial oxygens preferentially occupy every third atomic layer below the terminal (111) surface. This pattern is a product of the delocalized electronic structure of nonsurface U atoms, which also allows for the coexistence of three U oxidation states. — NW


APPLIED OPTICS

Dealing with big data

Data generation often occurs at such a high rate that it cannot be analyzed on the fly but must be stored and archived for access later on. While banks of magnetic hard drives are the storage medium of choice at present, the total capacity, recording times, and required energy burden are not expected to keep pace with the data generation rate. Li et al. look to optical recording as a possible solution. Combining superresolution nanoscopy to record tiny binary bits in a photosensitive medium with multifocusing array techniques to access multiple layers within the medium, it should be possible to achieve storage capacities of about 30 terabits per disk and data recording rates exceeding gigabits per second. — ISO