secreted by lung cells to inhibit cancer stem cell programs in metastatic lesions and to enforce tumor dormancy. Coco expression induced tumor colonization and macrometastases in the lung, but not in the bone or brain where BMP signaling to tumor cells is low or not involved in tumor dormancy. Further studies will be needed to show whether Coco can also function to promote metastasis independently from blocking BMP.

In human breast cancers, Coco expression correlated with reduced overall survival. The authors also defined a Coco-dependent gene expression signature that predicted metastatic relapse in the lung and poor survival in human cancer from several data sets. However, additional human data are necessary to test whether this signature can be used to identify patients at risk of lung metastasis.

Proteins involved in enforcing tumor dormancy or promoting exit from it, such as Coco, could be therapeutic targets for treating metastatic cancer. —*CP*

■ IMMUNOLOGY

Tweaking T cell responses

The type of immunity elicited by the pathogenic bacteria *Yersinia enterocolitica* is now shown to depend on the route of infection (*J. Exp. Med.* **209**, 1437–1444).

R. William DePaolo *et al.* showed that oral infection of mice with *Y. enterocolitica* promotes T helper type 17 (T_H17) immunity, whereas systemic infection with the same pathogen leads to a T_H1 response. They found that the T_H17 response induced by oral *Y. enterocolitica* was dependent on the presence of Toll-like receptor 1 (TLR1). TLR1-deficient mice produced reduced levels of the cytokines interleukin-6 (IL-6) and IL-23, which are involved in T_H17 polarization, compared with infected control mice. Consistent with this, the authors found that TLR1 signaling in dendritic cells (DCs) was involved in the production of IL-6 and IL-23 in the presence of *Y. enterocolitica*. TLR1 may also influence DC migration in response to oral *Y. enterocolitica* infection, as De Paolo *et al.* showed that TLR1-deficient mice had a reduced number of DCs in their mesenteric lymph nodes compared with infected controls.

These findings may have implications for vaccine development, indicating the importance of understanding the type of pathogen and its effects on specific tissues for designing a vaccine to elicit an appropriate immune response. —*MS*

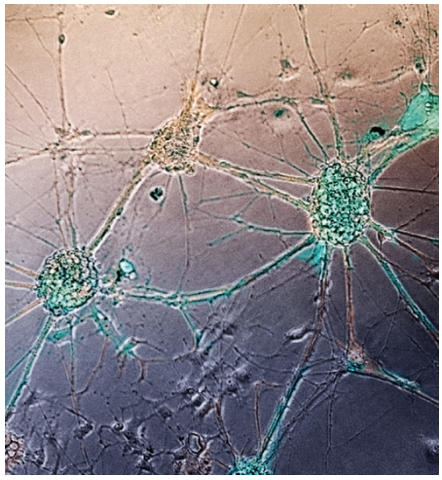
■ NEUROSCIENCE

Disabling axonal degeneration

Nerve injury triggers an autodestruct program in axons, leading to their degeneration. Now, a new study (*Science* **337**, 481–484) uncovers a suppressor of this pathway in mice and flies.

As a result of peripheral neuropathy or brain injury, the portion of an axon distal to the site of injury degenerates, in a process termed Wallerian degeneration. Whether this is a passive process due to the loss of trophic support or an active process that is induced upon injury remains unclear.

Using a genetic screen of neurons from *Drosophila* mutants, Marc R. Freeman and his colleagues identified mutant axons that, when injured, did not degenerate. This protection was conferred by loss-of-function mutations in a gene termed *dsarm* (*Drosophila* sterile alpha and Armadillo motif).



Francois Paquet-Durand / Photo Researchers, Inc.

In a mammalian model of sciatic nerve injury, axonal degeneration was reduced in mice deficient in the mouse ortholog of *dsarm*, Sarm1. In culture, *Sarm1*$^{-/-}$ neurons were also protected from degeneration upon axotomy. These same neurons, however, were not resistant to degeneration induced by other stressors, including growth factor deprivation, suggesting Wallerian degeneration is an active program induced in axons with injury. Although it remains unclear how Sarm1 is activated with injury and, downstream, how it activates degeneration, these findings suggest that Sarm1 could be targeted therapeutically to inhibit axonal degeneration. —*KDS*

Written by Kevin Da Silva, Alison Farrell, Randy Levinson, Carolina Pola and Meera Swami

New from NPG

Antibiotics in early life alter the murine colonic microbiome and adiposity
Cho, I. *et al. Nature* doi:10.1038/nature11400 (22 August).
Low-dose antibiotics have been used to promote animal growth in the agricultural industry for many decades. Exploring the underlying mechanisms of such treatment in mice, the authors show that subtherapeutic doses of antibiotics changed the composition of the gut microbiome, increased the concentrations of metabolic hormones and increased adiposity in young mice.

The malaria parasite *Plasmodium vivax* exhibits greater genetic diversity than *Plasmodium falciparum*
Neafsey, D.E. *et al. Nat. Genet.* doi:10.1038/ng.2373 (5 August).

***Plasmodium cynomolgi* genome sequences provide insight into *Plasmodium vivax* and the monkey malaria clade**
Tachibana, S.-I. *et al. Nat. Genet.* doi:10.1038/ng.2375 (5 August).
Two studies report the sequencing of new genomes of the malaria parasites *Plasmodium vivax* and *Plasmodium cynomolgi*, providing new insights into genetic variation in these species.

TGF-β is responsible for NK cell immaturity during ontogeny and increased susceptibility to infection during mouse infancy
Marcoe, J.P. *et al. Nat. Immunol.* doi:10.1038/ni.2388 (5 August).
The authors show that, similar to human infants, young mice are more susceptible to viral infection due to a lack of mature natural killer (NK) cells. Mechanistically, in mice this effect seems to be mediated by transforming growth factor-β (TGF-β), which limits immature NK proliferation and maturation.

HDAC2 regulates atypical antipsychotic responses through the modulation of *mGlu2* promoter activity
Kurita, M *et al. Nat. Neurosci.* doi:10.1038/nn.3181 (5 August).
Atypical antipsychotic administration led to decreased histone acetylation and downregulated transcription at the metabrotropic glutamate 2 receptor (*mGlu2*) promoter. This was associated with increased binding of histone deacetylase 2 (HDAC2) to the *mGlu2* promoter; these effects could be rescued by HDAC inhibitors. These results may provide clues into why combining HDAC inhibitors with antipsychotics can improve treatment efficacy in schizophrenia.