› RESEARCH IN BRIEF

A novel model for Zika viral infection

The current Zika virus (ZIKV) epidemic is a major health crisis with potentially devastating effects to societies across the globe. A challenge for treating and preventing ZIKV infections, which are associated with severe microcephaly in newborns, is understanding how the virus operates mechanistically. A group of researchers now reports the development of a nonhuman primate model of ZIKV infection that is more clinically relevant to human infection (*Nat. Med.* **22**, 1256–1259; 2016). The team infected a pregnant pigtail macaque with ZIKV and, using magnetic resonance imaging and histology, found fetal brain lesions, including cerebral white matter hypoplasia, periventricular white matter gliosis, and axonal and ependymal injury. This new model could provide researchers with a critical tool to develop and test therapies to prevent ZIKV-associated fetal brain injury. *DMG*

Fiber-free diets induce destructive microbes

Although the health benefits of fiber-rich diets are well known, and the connection between diet and microflora are well appreciated, how fiber levels can impact gut microbiota is poorly understood. Reporting in *Cell*, researchers used gnotobiotic mouse models and fiber-deficient diets to explore the effects on the microbiome, and found significant negative consequences to the colonic mucus barrier and animal health (*Cell* **167**, 1339–1353; 2016). When given fiber-deficient diets, either chronically or intermittently, mucus-degrading bacteria flourished in the mouse's gut, causing a breakdown in the colonic mucosal-barrier normally serving as a protection from pathogens. Fiber-deficient mice were more susceptible to developing lethal colitis, owing to increased access to the colonic epithelium by mucosal pathogen *Citrobacter rodentium*. *DMG*

A zebrafish screening strategy for identifying novel mammalian genetic pathways

Forward genetic screens have been a valuable tool for decades, allowing biologists to uncover the molecular basis of development and disease traits. When applied to lower-level species, which can be treated and phenotyped at higher-throughput rates, forward genetic screens can be extremely efficient. However, linking potential genes identified in these screens to mammalian biology can be challenging. Iwanami *et al.* took advantage of the evolutionarily conserved process of lymphocyte differentiation to identify novel and important genetic pathways for the adaptive immune system (*Cell Reports* **17**, 2259–2270; 2016). They first validated their screen by identifying transcription factors and cytokine signaling components known to be important in mammalian immune system function, but also identified a novel set of genes encoding proteins required for pre-mRNA processing, establishing a new role for these genes in lymphocyte differentiation. *DMG*

Parental diet can influence zebrafish offspring fitness

Diet is a well-known variable influencing health and disease, and recent work has shown that a parent's diet can have lasting influences on the development and wellbeing of offspring. Using a zebrafish model of diet-induced obesity, Newman *et al.* found that well-fed fish had higher levels of fertility compared to less fed counterparts (*PLoS ONE* **11**, e0166394; 2016). Additionally, transcriptome analysis in eggs from obese fish revealed higher expression levels of genes involved in metabolic processes. They also note that as the eggs developed into adults, fish from well-fed parents had significantly increased levels of physical activity when exposed to high-nutrient conditions, compared to fish derived from lean parents. Overall, the authors conclude that zebrafish parental dietary intake can have lasting effects on the fitness of offspring. *DMG*

Social stress and sickness

One's social status can be a considerable source of stress, and stress and sickness often go hand-in-hand. Rhesus macaques, like people, are social animals, living in stratified social hierarchies. What happens to the immune system when a macaques' status is disrupted is explored in new research published in *Science* (**354**, 1041–1045; 2016).

The multidisciplinary team manipulated the social groups of female macaques housed at the Yerkes National Primate Research Center and then tested the immune profiles of individuals as they were promoted and demoted over the course of the study. Though the effects were reversible, low-status macaques showed much more pronounced inflammatory responses than those higher in the chain. The results indicate a social gradient linking stress to sickness, a potential consideration for future research involving social species. *EPN*

The specifics of pain

Neuronal responses to pain have generally been considered polymodal; regardless of the cause, pain triggers nociceptors the same way. Previous recording techniques, however, may have been too blunt; new *in vivo* research suggests pain perception may be much more nuanced (*Sci. Adv*. **2**, e1600990; 2016).

Fluorescent indicators have enabled researchers at University College London to visualize neuronal responses to different sources of pain in an intact animal. Sensory neuron activation in the lumbar dorsal root ganglion was visualized in GCaMP-expressing mice as their hindpaw was exposed to hot and cold water as well as quick pinches and pokes. The majority of neurons only responded to a single source, though artificial inflammation did blur the distinction. The results suggest multiple pain pathways exist in healthy animals. *EPN*

Fighting bacteria, with bacteria

Overuse and misuse of historically effective therapies have reduced the potency of traditional antibiotics; even those drugs for use as a last resort are slowly being thwarted by increasingly resistant bugs. But bacteria, like any living organism, are susceptible to the rules of ecology. A new study suggests fighting bacteria...with bacteria (*Curr. Biol*. **26**, 3343–3351; 2016).

The researchers deployed a predatory bacteria, *Bdellovibrio bacteriovorus*, against an antibiotic-resistant strain of *Shigella* in the translucent environment of a larval zebrafish. *Bdellovibrio* alone was harmless, but when injected into a fish infected by an otherwise lethal dose of *Shigella*, it began consuming its pathogenic prey, giving leukocytes the chance to clear the diminished population.The results provide proof-of-principle of "living antibiotics" working in conjunction with the immune system. *EPN*

Nanofibers vs. biofilms

Implanted devices carry an inherent risk of infection. Biofilms, which can form on the surface of implants and become deeply embedded with the surrounding tissue, are particularly challenging to treat. Researchers at Johns Hopkins University have devised a way of treating biofilms, without removing the implant, with the help of electrospun nanofibers (*Proc. Natl. Acad. Sci. U.S.A.* **113**, E6919–E6928; 2016).

The team's nanofiber coating consists of two polymer matrices; different combinations of antibiotics can be embedded in the polymers, which then release the drugs at different rates. They tested three antibiotic combinations with a mouse model of prosthetic joint infection, finding that their coatings prevented biofilm formation and subsequent infection without disrupting osseointegration. The coating allows sustained delivery of antibiotics that can be tailored as needed. *EPN*