

## › NEWS UPDATES

### A rat knows what it knows

Researchers at the University of Georgia (Athens, GA) recently conducted trials that appear to demonstrate an unprecedented mental capacity in rats: metacognition.

Metacognition is awareness of one's own cognitive state or process; in other words, the ability to think about thinking. Unfortunately, ascertaining the mental state of animals is difficult because people cannot yet directly communicate with them about their mental state.

To overcome this communication problem with rats, Allison Foote and Jonathon Crystal adapted a metacognition test developed for rhesus monkeys. In this test, rats responded to noises of varying lengths. The rats indicated via levers whether they thought the noise was 'short' or 'long'. A correct choice was rewarded with six pellets; an incorrect choice yielded nothing. In some trials, the rats were allowed to 'opt out' of the test by pushing a third lever that yielded three pellets (*Curr. Biol.*, March). Presumably, rats that realized they could not reliably categorize a noise would choose to forgo the test in exchange for three pellets—which is what Foote and Crystal found when they administered the test. If more research corroborates this result, it may lead to a rodent model of the neural mechanisms of metacognition.

### The science of sunbathing

The protein p53, long recognized for its role in suppressing cancer, has now been implicated in a more superficial process: suntanning.

p53 is a transcription factor responsible for regulating genes that coordinate the cellular response to DNA damage and other changes that can lead to cancer. Previous research has demonstrated that p53 helps prevent skin tumors following exposure to ultraviolet (UV) radiation.

Investigating the link between p53 and UV light one step further, David Fisher, a researcher at Harvard Medical School (Boston, MA), and his coworkers demonstrated that p53 makes tanning possible. Fisher and his colleagues tested *p53*-knockout mice by irradiating them with UV light daily for ten weeks. Despite the UV exposure, the knockout mice did not develop pigmentation on their ears or tails (the two areas of mouse skin that have melanocytes, similar to human skin). In contrast, the ears of wildtype mice exposed to the same UV regimen tanned markedly. The researchers found that this effect held up even when they used a chemical to induce pigmentation rather than UV light (*Cell*, 9 March).

These results indicate that p53 is necessary to initiate the chain of events that leads to suntanning and other forms of hyperpigmentation. It remains to be seen whether p53 is also involved in normal, uninduced pigmentation.

### Preeclampsia modeled in baboons

Reduced blood flow to the placenta causes a preeclampsia-like condition in baboons, according to a new study by Australian researchers. The study also pinpointed a potential molecular link between placental hypoxia and the clinical manifestations of the potentially fatal condition.

Preeclampsia occurs in ~5% of pregnancies and is characterized by hypertension, proteinuria, renal insufficiency, liver dysfunction, and neurological disturbances, occurring in the second half of pregnancy. At present, preeclampsia can only be cured by delivering the fetus and placenta.

The cause of preeclampsia is unclear, although previous studies have suggested that placental hypoxia may be a factor. In addition, preeclamptic women have been shown to have elevated circulating levels of soluble fms-like tyrosine kinase (sFLT-1), a protein that inhibits blood vessel growth.

In the new study, Angela Makris of the Heart Research Institute and University of Sydney (Australia) used unilateral uterine artery ligation to reduce placental blood flow by 40% in five pregnant baboons (*Kidney Int.*, doi: 10.1038/sj.ki.5002175, published online 21 March). The animals developed high blood pressure, proteinuria, and renal histological changes that mirror those seen in the kidneys of preeclamptic women. In addition, the baboons showed significantly increased levels of sFLT-1, arising predominantly from the placenta, suggesting that it might mediate the vascular changes that lead to hypertension and proteinuria.