

CANCER

Spoilers of chemotherapy

Cancers often bounce back after the initial assault of chemotherapy. In breast cancers this is thanks, at least in part, to the activities of a class of immune cell called macrophages, say Johanna Joyce and her colleagues at Memorial Sloan-Kettering Cancer Center in New York.

The scientists treated tumour-bearing mice with high-dose paclitaxel (Taxol), a common breast-cancer chemotherapeutic. They found a higher influx of macrophages into treated than untreated tumours. This, in turn, resulted in elevated levels of enzymes called cathepsin proteases, which are made by the macrophages and are known to facilitate several disease processes, including tumour growth. Mouse cancer cells cultured with macrophages and treated with Taxol had significantly lower death rates than Taxol-treated cell lines cultured alone. Treating the cells with a cathepsin inhibitor called JPM completely reversed this effect.

Giving mice both Taxol and JPM significantly improved Taxol's efficacy against both primary and metastatic tumours.

Genes Dev. 25, 2465–2479 (2011)

NEUROIMMUNOLOGY

A boost to the brain's barrier

A biochemical pathway involved in development also maintains a physiological brain-defence system that is implicated in the autoimmune disease multiple sclerosis (MS).

The blood-brain barrier (BBB) protects the brain by preventing cells and many



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BIODIVERSITY

Amazon frogs galore

The number of frog species living in the Amazon basin could be several times greater than currently recognized.

A team led by Chris Funk at Colorado State University in Fort Collins gathered and analysed genetic, morphological and acoustic data for 252 *Engystomops* frogs and 208 *Hypsiboas* tree frogs from across six Amazonian countries, focusing on Ecuador. The authors found that the two known species

of *Engystomops* in fact encompass between five and seven species. Meanwhile, the two recognized *Hypsiboas* species represent between six and nine species (one undescribed species pictured).

The team concludes that more accurate estimates of biodiversity will improve risk assessments and conservation efforts.

Proc. R. Soc. B <http://dx.doi.org/10.1098/rspb.2011.1653> (2011)

molecules from entering it, and is disrupted in MS. Signalling between brain cells called astrocytes through the Hedgehog pathway promotes the maturation of cells lining the brain's blood vessels and formation of the BBB.

Alexandre Prat at the University of Montreal in Canada and his group found that inhibiting this pathway in an animal model of MS boosted immune-cell invasion of the brain and increased demyelination — loss of neurons' protective sheath, the hallmark of MS. Stimulating

Hedgehog signalling in cultured human cells caused fewer inflammatory T cells to interact with and migrate across blood-vessel cells.

Many patients with MS experience cyclical inflammatory attacks of the brain, and they also have higher levels of Hedgehog signalling. The authors think that this pathway may be involved in rebalancing the immune response after each attack.

Science <http://dx.doi.org/10.1126/science.1206936> (2011)

BIOENGINEERING

Two-in-one biofuel maker

A strain of the bacterium *Escherichia coli* has been genetically engineered to break down switchgrass into sugars, and then convert those sugars into three types of biofuel. This consolidated process, which does not require the addition of enzymes, could lower the cost of producing fuels from biomass.

Jay Keasling at Lawrence Berkeley National Laboratory