IN BRIEF

TUMOUR IMMUNOLOGY

Tumour-bearing mice feel the cold

This study describes marked differences in the antitumour immune response among mice housed at different temperatures. Healthy mice prefer an ambient temperature of 30–31 °C (known as 'thermoneutrality'), but the standard housing temperature for laboratory mice is 20–26 °C (known as 'subthermoneutrality'), which causes chronic metabolic cold stress. In several mouse tumour models (of transplanted and chemically induced tumours), tumour growth and metastasis were increased in wild-type, but not in immunodeficient, mice that were housed at subthermoneutrality compared with those housed at thermoneutrality. Activated, antigen-specific $CD8^+$ T cells were present at a higher frequency in mice housed in thermoneutral environments and were required for the delay in tumour growth. Also, tumour-bearing mice housed at thermoneutrality had fewer immunosuppressive cells — regulatory T cells and myeloid-derived suppressor cells — than mice housed at subthermoneutrality. Furthermore, tumour-bearing mice preferred a temperature of 38 °C; the authors suggest that the metabolic stress of tumour growth may compound the effects of cold stress on the immune system.

ORIGINAL RESEARCH PAPER Kokolus, K. M. *et al.* Baseline tumor growth and immune control in laboratory mice are significantly influenced by subthermoneutral housing temperature. *Proc. Natl Acad. Sci. USA* http://dx.doi.org/10.1073/pnas.1304291110 (2013)

HIV

Mechanisms of T cell polyfunctionality

Polyfunctional T cells — having the ability to secrete cytokines and chemokines and to mediate cytolysis — are highly predictive of protective immunity but often become exhausted in chronic infections in response to persistent antigen stimulation, through a mechanism that is only partly determined by the upregulation of inhibitory receptors such as programmed cell death protein 1 (PD1). This study shows that high antigen concentration decreases the proportion of polyfunctional T cells in both memory and naive $CD8^+$ T cell populations in a manner independent of PD1 signalling but dependent on the MAPK ERK pathway. High levels of antigen upregulate expression of sprouty 2 (SPRY2), a negative regulator of MAPK ERK signalling. HIV-specific patient T cells have increased levels of SPRY2, and *SPRY2* knockdown in these T cells increased HIV-specific polyfunctionality.

ORIGINAL RESEARCH PAPER Chiu, Y.-L. *et al.* Sprouty-2 regulates HIV-specific T cell polyfunctionality. *J. Clin. Invest.* http://dx.doi.org/10.1172/JCI70510 (2013)

TUMOUR IMMUNOLOGY

Boosting macrophage responses to brain tumours

Brain tumour-initiating cells (BTICs) are stem cell-like transformed cells that promote the formation and recurrence of gliomas. Sarkar *et al.* studied the growth of BTICs isolated from patients with malignant gliomas. They found that microglia or medium conditioned by microglia, monocytes or macrophages from non-glioma patients could inhibit BTIC growth *in vitro*. By contrast, microglia from patients with glioma did not restrict BTIC growth. The authors screened more than 1,000 compounds and found that treatment of microglia with the anti-fungal drug amphotericin B increased their ability to inhibit BTIC growth. Notably, microglia from patients with glioma could inhibit BTIC growth if they were treated with amphotericin B, and the drug also inhibited brain tumour growth in mice. This study suggests that amphotericin B could be used to promote antitumour immune responses in patients with glioma.

ORIGINAL RESEARCH PAPER Sarkar, S. *et al.* Therapeutic activation of macrophages and microglia to suppress brain tumor-initiating cells. *Nature Neurosci.* http://dx.doi.org/10.1038/nn.3597 (2013)