Masala

A step closer to artificial blood

Although artificially engineered haemoglobins are available, their lack of stability precludes clinical use. A team of molecular biologists from India has successfully created a new, stable form of haemoglobin (Hb). The truncated Hb (SynHb) from the freshwater cyanobacterium *Synechocystis* exhibits hexacoordinate haeme chemistry. This is the most stable Hb known. The team modified sperm whale myoglobin and the resulting molecule has high haeme and is stable to denaturants and exhibited ligand binding and auto-oxidation rates similar to the wild type protein. This work opens up the possibility of creating artificial blood substitutes based on stable Hb (*J Biol Chem* published online 1 Dec 2014; doi: 10.1074/jbc.M114.603225).

Autologous stem cell-based corneal grafts

Treatable blindness continues to be prevalent because of a shortage of donor corneas. Researchers from the University of Pittsburgh, USA investigated direct treatment of corneal scarring using autologous stem cells. Mesenchymal cells were expanded from small superficial biopsies of human cadaveric corneo-scleral rims. Limbal biopsy-derived stromal cells (LBSCs) expanded rapidly in media containing human serum, were highly clonogenic, and could generate spheres expressing stem cell genes (*ABCG2, Nestin, NGFR, Oct4, PAX6*, and *Sox2*). Human LBSCs differentiated into keratocytes expressing characteristic marker genes and organized a thick lamellar stroma-like tissue containing aligned collagen and keratan sulphate proteoglycans when cultured on aligned nanofibre substrata. When engrafted into mouse corneal wounds, LBSCs prevented the formation of light -scattering scar tissue containing fibrotic matrix components. The corneal limbus can be easily biopsied from the eye of an individual needing a corneal graft. This could serve as a source of an autologous graft for replacing a damaged cornea (*Sci Transl Med* 2014;**6:**266ra172).

Screening for prostate cancer: Long-term results

The European Randomized study of Screening for Prostate Cancer (ERSPC) is a multicentre, randomized trial which assessed screening for prostate cancer using prostate-specific antigen (PSA; cut-off value for a prostate biopsy 3 ng/ml) testing in 8 European countries. Beginning in 1993, it randomly allocated 162 388 eligible men aged 50–74 years to screening (at an interval of 2 to 4 years) or no screening (control). After 13 years of follow-up, 7408 men with prostate cancers were diagnosed in the intervention group (*n*=72 891) and 6107 in the control group (*n*=89 352). The absolute risk reduction of death from prostate cancer was equivalent to one prostate cancer death averted per 781 men invited for screening or one per 27 additional prostate cancer detected. The difference in prostate cancer mortality was 21%. At a population level, these data support the use of PSA screening for prostate cancer in men aged 50–74 years (*Lancet* 2014;**384:**2027–35).

A robotic arm for patients with spinal cord damage

Researchers from the University of Pittsburgh, USA had shown continuous translation, orientation and one-dimensional grasping control of a prosthetic limb (seven degrees of freedom) by a human subject with tetraplegia using a brain–machine interface (*Lancet* 2013;**381:**557–64). Taking their work further, they successfully expanded the scope of the control signal by also extracting hand-shape commands from the two 96-channel intracortical electrode arrays implanted in the subject's left motor cortex. Four new control signals, dictating prosthetic hand shape, allowed the subject to control the prosthetic limb with ten degrees of freedom (three-dimensional [3D] translation, 3D orientation, four-dimensional hand shaping) simultaneously. This allows grasping of objects with the robotic hand making the prosthesis far more useful (*J Neural Eng* 2014 doi:10.1088/1741-2560/12/1/016011).

Dual antiplatelet therapy after coronary stenting: How long is too long?

Dual antiplatelet therapy with aspirin and a thienopyridine such as clopidogrel is given after coronary stenting to prevent stent thrombosis. A multicentre, industry-sponsored trial (DAPT) enrolled 9961 patients undergoing coronary stenting with drug-eluting stents. After 1 year of treatment with a thienopyridine drug (clopidogrel or prasugrel) and aspirin, patients were randomized to continue receiving thienopyridine treatment or to receive placebo for another 18 months; all patients continued receiving aspirin. Continued treatment with thienopyridine, as compared with placebo, reduced the rates of stent thrombosis (0.4% *v*. 1.4%) and major adverse cardiovascular and cerebrovascular events (4.3% *v*. 5.9%). The rate of myocardial infarction was lower with thienopyridine treatment than with placebo (2.1% *v*. 4.1%). The rate of death from any cause was 2% in the group that continued thienopyridine therapy and 1.5% in the placebo group (p=0.05). The rate of moderate or severe bleeding was significantly higher in patients who continued thienopyridine treatment (2.5% *v*. 1.6%; *N Engl J Med* 2014;**371:**2155–66).

Make way for 'young' blood

Researchers in Canada compared postoperative outcomes in patients undergoing non-emergent, on-pump cardiac surgery between January 2005 and September 2013 at a single institution. Based on the packed red blood cell transfusions given, patients were divided into two groups—those who had received 'new blood' (donated less than 2 weeks before transfusion, *n*=1052) and those given 'old' (donated over 2 weeks earlier) or a mix of 'old' and 'new' blood (combined *n*=963). Postoperative complications including mortality, re-exploration for bleeding, prolonged (>24 hours) ventilation, infection, atrial fibrillation, renal failure and a composite of these outcomes were less frequent in the group receiving 'new' blood (odds ratio 0.79 for the composite outcome; *Can J Cardiol* 2014;**30:**S346–7).

Paracetamol ineffective in low back pain

In a multicentre trial, researchers in Australia randomized patients with acute low back pain to receive up to 4 weeks of regular doses of paracetamol (three-times per day; equivalent to 3990 mg paracetamol per day; *n*=550), as-needed doses of paracetamol (taken when needed for pain relief; maximum 4000 mg paracetamol per day; *n*=549) or placebo (*n*=553). All participants received best-evidence advice and were followed up for 3 months. The primary outcome was time until recovery from low-back pain, with recovery defined as a pain score of 0 or 1 (on a pain scale of 0–10) sustained for 7 consecutive days. The median time to recovery was 17 days in the regular group, 17 days in the as-needed group and 16 days in the placebo group (adjusted p=0.79). Adherence and adverse effects were comparable between groups (*Lancet* 2014;**384:**1586–96).

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