Sympathetic Innervation Promotes Arterial Fate (p 607)

Signaling from sympathetic nerves promotes arterial fate, report Pardanaud et al.

Arterial, venous, and lymphatic vascular endothelial cells differ in their morphology and function, but little is known about how these differences arise. During early embryogenesis, endothelial cells are highly plastic. For example, arterial endothelial cells isolated from a day-7 quail embryo, when transplanted into a chick embryo, can colonize both veins and arteries, while those from older quail embryos can colonize only arteries. Pardanaud and colleagues now show that by embryonic stage 11 (E11), <10 percent of quail arterial cells can colonize chick veins. Because in birds E11 corresponds with arterial innervation, the team examined whether sympathetic nerve signals influence arterial fate. They found that both chemical and surgical denervation of quail aortas increased the percentage of the endothelial cells that could colonize chick veins, while coculturing fragments of younger (E8) quail arterial endothelium with sympathetic nerves decreased the ability of these cells to colonize veins. The team also showed that activation of adrenergic receptors by catecholamines from sympathetic nerves pushed endothelial cells to an arterial fate. Together, the results uncover a novel mechanism driving vessel development, which could be important for developing strategies to revascularize ischemic tissue.

Repeated Administration of Cardiac Progenitor Cells (p 635)

For effective cell therapy, administer multiple doses, say Tokita et al.

Although preclinical studies using stem and progenitor cells to repair damaged hearts have been promising, clinical trials have produced inconsistent or insignificant results. One major hindrance to potential benefits could be the poor retention of cells when injected into the heart. Given that all previous clinical studies have relied on a single injection of cells, Tokita and colleagues explored whether repeated administrations of these cells might boost their beneficial effects. To test this idea, the team injected cardiac progenitor cells into the hearts of rats 30 days after an experimentally induced infarction. While 1 group of rats received only this injection, the other group received 2 additional cell injections, 35 and 70 days later. They found that the rats that received a single dose of cells showed initial improvements in left ventricle function, but this effect was not sustained. In contrast, the rats that received multiple cell injections exhibited progressive improvements in left ventricle function with each injection. The cumulative benefits of the 3 injections were approximately triple that of the single dose. Based on these findings, Tokita and colleagues suggest the therapeutic efficacy of stem/progenitor cells could be significantly enhanced by repeated treatments.

Orthostatic Heart Rate Recovery and Mortality (p 666)

Heart rate recovery upon standing predicts a person’s risk of mortality, report McCrory et al.

The speed at which a person’s heart rate and blood pressure return to normal after exercise is a known predictor of their risk of death from cardiovascular disease. But this prediction is based on data from individuals with pre-existing cardiovascular disease. Moreover, there are varying definitions of “slow recovery” and no standard protocols for assessing heart rate recovery—with measurements taken anywhere from 1 to 5 minutes after exercise. McCrory and colleagues, therefore, examined cardiovascular recovery in 4475 people (aged 50 and above) after they moved from lying to standing, which is a potent cardiovascular stressor, causing heart rate to rise and blood pressure to drop. They found that slower recovery was associated with older age and that the rate of recovery could distinguish between individuals with or without diagnosed cardiovascular disease. Moreover, there is a strong correlation between cardiovascular stressor, causing heart rate to rise and blood pressure to drop. They found that slower recovery was associated with older age and that the rate of recovery could distinguish between individuals with or without diagnosed cardiovascular disease. During a 4-year follow-up, slow recovery was also a strong predictor of all-cause mortality. Indeed, those with the slowest recovery were 2.3 times more likely to die than those with the fastest recovery time. Heart rate recovery immediately after standing could thus be a simpler, more cost-effective measure of cardiovascular health than, for example, treadmill stress testing, say the authors.