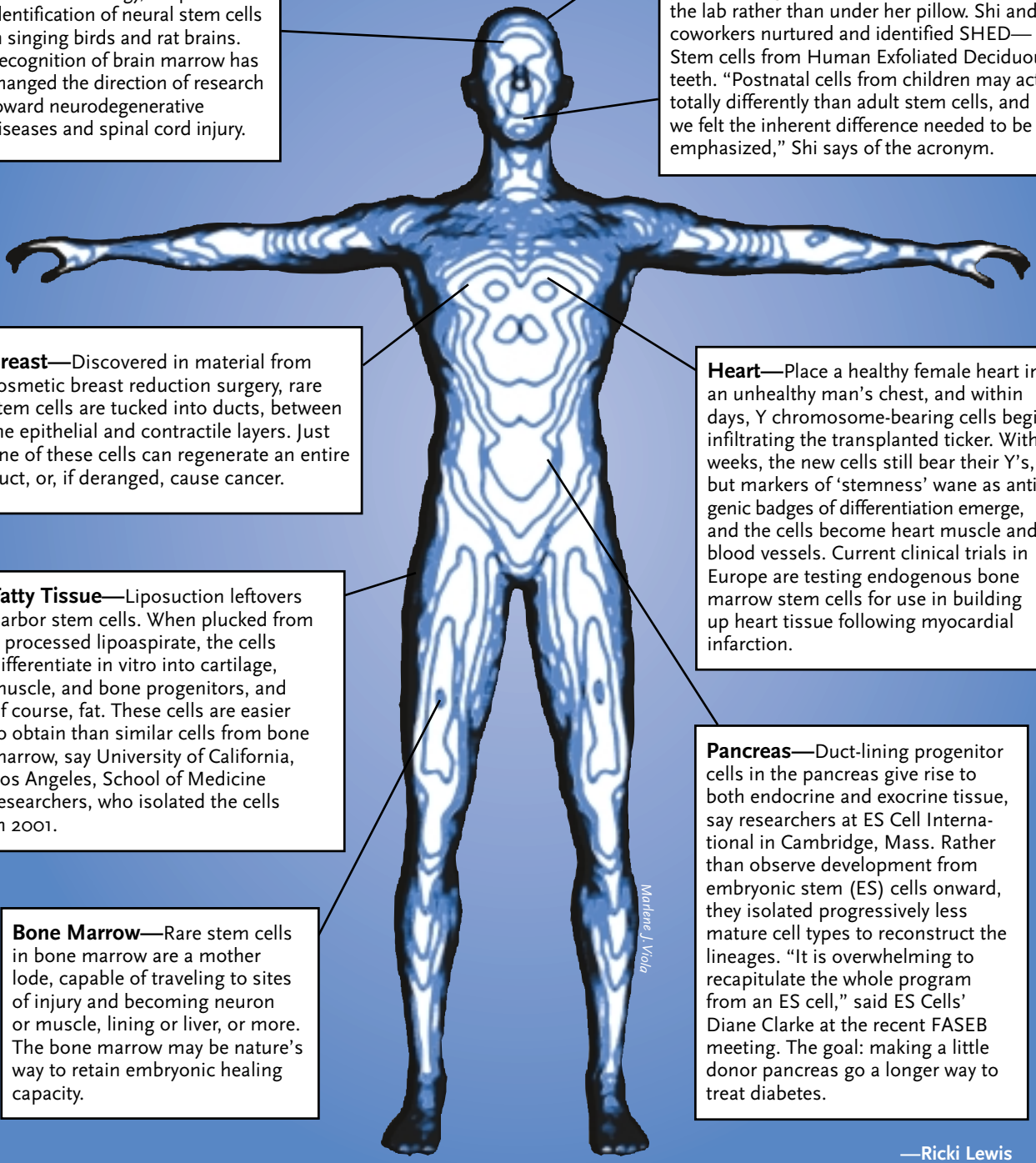
Sources for Adult Human Stem Cells

Brain—It took a handful of cancer patients donating their brains to finally counter the "no new neurons" mantra that had permeated biology, despite earlier identification of neural stem cells in singing birds and rat brains. Recognition of brain marrow has changed the direction of research toward neurodegenerative diseases and spinal cord injury.

Hair and Skin—Stem cells in hair follicles give rise to epidermis, long known from observations on healing from burns.

Baby Teeth—When young Julia Shi lost a baby tooth, her dad, National Institutes of Health pediatric dental researcher Songtao Shi, spotted red material on it. When his six-year-old daughter lost another one, it went to the lab rather than under her pillow. Shi and coworkers nurtured and identified SHED—Stem cells from Human Exfoliated Deciduous teeth. "Postnatal cells from children may act totally differently than adult stem cells, and we felt the inherent difference needed to be emphasized," Shi says of the acronym.



Marlene J. Viola

Breast—Discovered in material from cosmetic breast reduction surgery, rare stem cells are tucked into ducts, between the epithelial and contractile layers. Just one of these cells can regenerate an entire duct, or, if deranged, cause cancer.

Heart—Place a healthy female heart into an unhealthy man's chest, and within days, Y chromosome-bearing cells begin infiltrating the transplanted ticker. Within weeks, the new cells still bear their Y's, but markers of 'stemness' wane as antigenic badges of differentiation emerge, and the cells become heart muscle and blood vessels. Current clinical trials in Europe are testing endogenous bone marrow stem cells for use in building up heart tissue following myocardial infarction.

Fatty Tissue—Liposuction leftovers harbor stem cells. When plucked from a processed lipoaspirate, the cells differentiate in vitro into cartilage, muscle, and bone progenitors, and of course, fat. These cells are easier to obtain than similar cells from bone marrow, say University of California, Los Angeles, School of Medicine researchers, who isolated the cells in 2001.

Pancreas—Duct-lining progenitor cells in the pancreas give rise to both endocrine and exocrine tissue, say researchers at ES Cell International in Cambridge, Mass. Rather than observe development from embryonic stem (ES) cells onward, they isolated progressively less mature cell types to reconstruct the lineages. "It is overwhelming to recapitulate the whole program from an ES cell," said ES Cells' Diane Clarke at the recent FASEB meeting. The goal: making a little donor pancreas go a longer way to treat diabetes.

Bone Marrow—Rare stem cells in bone marrow are a mother lode, capable of traveling to sites of injury and becoming neuron or muscle, lining or liver, or more. The bone marrow may be nature's way to retain embryonic healing capacity.

—Ricki Lewis