Neural stem cell therapies could eventually play a role in treating spinal cord injuries

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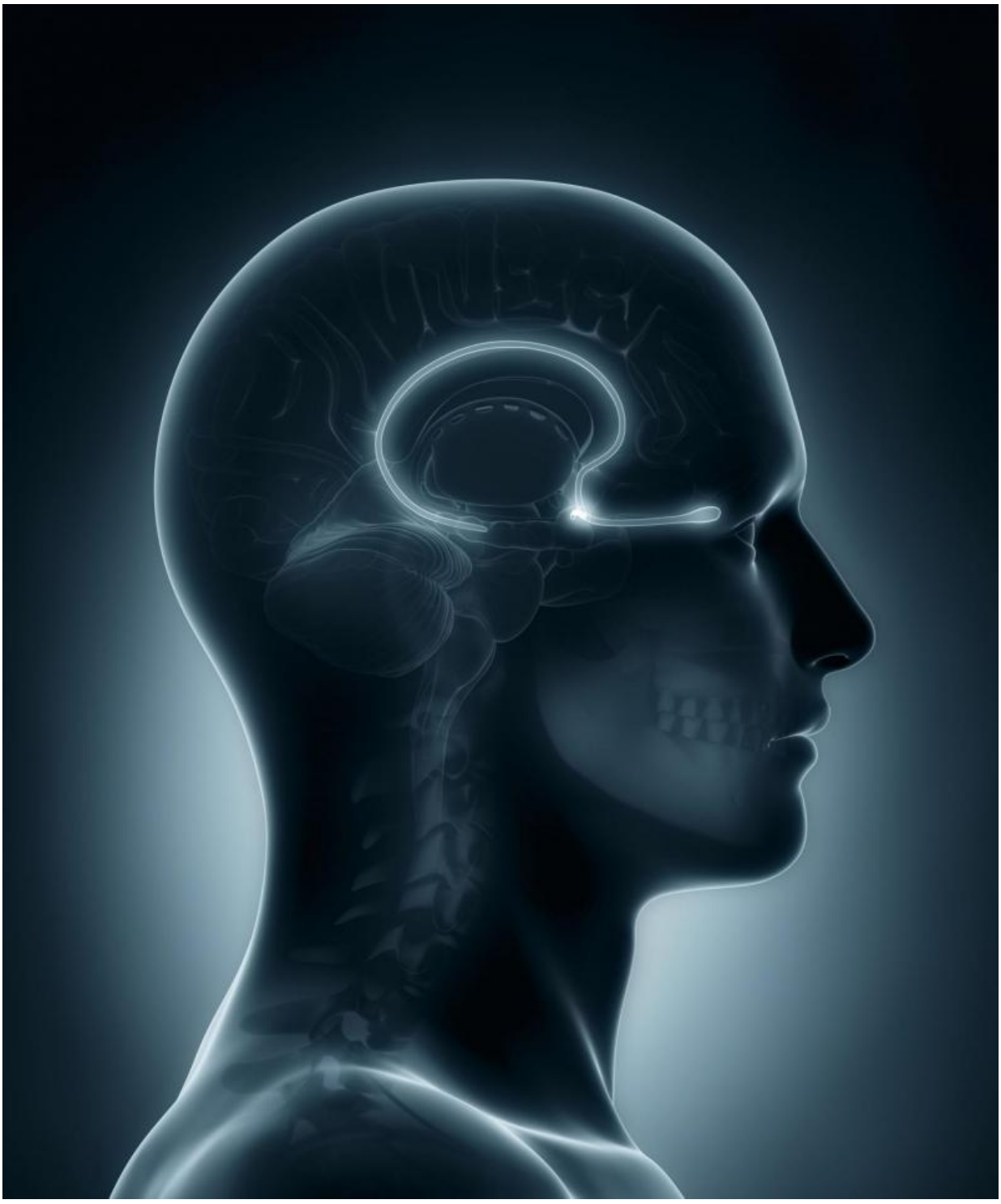

Neural stem cell therapies could eventually play a role in treating spinal cord injuries. Credit: woodoo007 / 123rf

Researchers in Qatar and Egypt, working with colleagues in Italy and the US, have found that injured spinal cords in rats show signs of tissue regeneration several weeks following injection with neural stem cells.

An estimated 2.5 million people worldwide live with spinal cord injury caused by various types of accidents and falls. "Much research is going into investigating the potential of stem cells in treating this and other neurological conditions," says Dr Hany Marei of Qatar University Biomedical Research Center.

The team isolated neural stem cells, which specifically differentiate into nerve tissue, from a structure in the front of the brain called the olfactory bulb. The olfactory bulbs were removed from human patients undergoing operations to extract brain tumours.

The team first genetically engineered the neural stem cells to carry a protein that causes them to fluoresce under the microscope. The researchers cultured the cells and demonstrated that they differentiated into a variety of nervous system cells.

They then injected the stem cells into rats whose spinal cords had been cut, and examined samples taken from the injured area regularly up until eight weeks after the injury. They compared these results with those of uninjured rats who did not receive injections, rats with injured cords that did not receive injections, and rats that underwent a sham operation in which the full procedure was done except for cutting of the spinal cord.

No signs of functional or tissue restoration were found in the control groups.

However, in the injured rats given neural stem cell injections, the team found that the stem cells differentiated into three types of nerve cells: oligodendrocytes and astrocytes—which are involved in the production

of the protective myelin sheath that surrounds nerves—and neurons. There were no signs of immunorejection. However, there were also no signs of functional improvement in the rats in the form of movement of their hind limbs paralyzed by the injury.

The results indicate that injecting stem cells at sites of spinal cord injury can produce relatively normal neurons and other nervous tissue elements, but further studies are needed to promote locomotor recovery, says Marei. One possibility is that eight weeks (the upper limit in this study) is not enough time to restore damaged nerve tracts and neuronal circuitry.

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