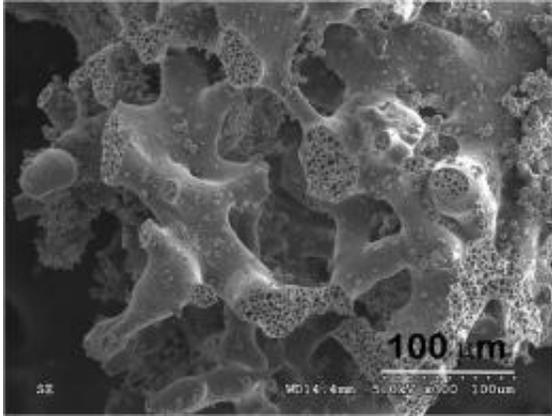


Glass helps damaged bone regenerate

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Like human bone, the glass bone scaffold developed by the researchers is porous at the macroscale as well as the nanoscale.

(PhysOrg.com) -- A prosthodontist from Egypt is helping Lehigh researchers develop bioactive glass that mimics the behavior of living tissue.

As a professor of prosthetic dentistry in Alexandria, Egypt, Mona Marei sees patients whose degenerating bones lead to fractures, tooth loss and failed dental implants.

Improving their health, she said recently at Lehigh, is the driving force behind her research in [tissue regeneration](#).

Marei traveled here to meet with her research partners at Lehigh's

International Materials Institute for New Functionality in Glass (IMI) and to deliver a seminar, “Engineering living tissue from scratch.” The event was sponsored by IMI and co-sponsored by the bioengineering program and the department of materials science and engineering.

Doctors have used transplants and implants for decades, primarily as replacements for damaged or missing body parts, said Marei, who is founder and head of Alexandria University’s tissue engineering science and technology program.

The newest developments in treating tissue disease or injury are regenerative therapies, which draw on engineering and life sciences to understand the structural and functional relationships within tissues.

Scientists have engineered living skin, cartilage and [bone](#). Now they are seeking to make materials that mimic tissue development in a living organism and to implant these materials into a [living organism](#).

“The lizard and salamander can regenerate limbs,” Marei said. “Why not human beings?”

A glass bone scaffold

Marei and IMI director Himanshu Jain lead a multidisciplinary team of researchers from Portugal, Senegal, Egypt, Princeton University and Lehigh who are developing glass that can treat patients with damaged bone. The glass has been successfully tested in vitro at Lehigh in the lab of Matthias Falk, associate professor of biological sciences. Marei and her group in Alexandria are testing it in animals.

The goal is to place in the body a glass “scaffold” that promotes transport of blood and nutrients through interconnected pores and allows new cells to grow, without causing infection or a systemic reaction. The scaffold

has chemical ingredients that match those of natural bone. When attached to injured or diseased bone, the [glass](#) spurs the bone to regenerate and is then absorbed into the body.

“It is so nice to have this complementary expertise coming together,” Jain said.

The collaboration allows researchers to share expensive lab equipment, cooperate on experiments, organize student exchanges and publish papers.

“Being a clinician, I always look at patients and how they benefit from the application,” Marei said. “To have a medical product that has an optimum character, is safe and easy to prepare, and whose outcome is well-known and repeated—I think it is good for Lehigh to produce such a thing.”

Making a difference

The bioglass material—which will be tested in the near future in human clinical trials—could help build denser bones as bases for [dental implants](#), help repair weakened or broken bones and even help facilitate drug delivery. Researchers are working on bioglass that can be formed readily into complex shapes such as a tube, a finger or a mandible.

The material can be particularly useful for patients with osteoporosis—a condition faced often by women, especially during menopause—which can lead to [tooth loss](#) and bone fractures.

Marei has been collaborating with Jain for about four years. During her weeklong stay at Lehigh, her first visit here, she toured labs and met faculty and students from diverse disciplines. She has extended invitations to Lehigh researchers to conduct in vivo experiments in her

laboratories in Alexandria. Falk and Shaojie Wang, a graduate student in materials science and engineering, plan to accept her offer with support from IMI.

Marei described herself as “very impressed” by Lehigh.

“It is very much a warm society and atmosphere,” she said.

Provided by Lehigh University

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