

# New study suggests wood as novel material for bone replacement

December 14 2012

---

Could ageing and damaged bones be replaced with implants based on wood? That's the question Italian researchers from the National Research Council of Italy (CNR) writing in a forthcoming issue of the *International Journal of Healthcare Technology and Management* hope to answer.

[Accidental damage](#), osteoporosis, osteoarthritis, [bone cancer](#) and other diseases, represent a constant threat in the lives of millions of people and, with the progressive ageing of the [world population](#), this threat can only increase. Indeed, more than 2.2 million bone grafting procedures are performed annually around the world and this number is increasing as lifestyles change and people live longer. As such, finding biomimetic materials that are similar to bone in terms of strength, flexibility and density is a pressing concern for medical scientists. The hope is that it might be possible to displace or at least augment metal alloy implants using such materials.

The structure of some woods at the [microscopic level](#) is very close to that of natural bone and it shares some of those desirable properties, such as unique biomechanical properties, i.e. high strength and lightness at the same time, due to its hierarchical organization.

Now, Ugo Finardi (Institute for Economic Research on Firms and Growth-CERIS-CNR, and University of Torino), and Simone Sprio (Institute of Science and Technology for Ceramics - ISTECC-CNR), have carried out a case study on the implications of a new technology recently

developed by the Research Group on [Biomaterials](#) of ISTEC. In that work, the researchers, Anna Tampieri, Simone Sprio and Andrea Ruffini, took inspiration from nature and used a nanotechnological approach to transform rattan wood into hierarchically organized implants. These biomimetic materials have a strength and flexibility similar to natural bone, something that cannot be achieved with current metal alloy technologies.

The technology described by Finardi and Sprio explains how the hierarchical [physical structure](#) of rattan wood might be used as a scaffold for creating a synthetic material to replace damaged and lost bone. An additional benefit is that such a material could be load bearing, a factor that has precluded the use of earlier biomimetic materials.

The processing of the raw wood to remove chemical components incompatible with implants for humans is long and complex but the benefits of producing a material that is so similar to bone and can be shaped to fit perfectly far outweigh such issues, the team suggests. The process involves heat treatment of the wood to remove cellulose, lignin and other plant materials but to leave behind a carbon skeleton that can then be infiltrated and reacted with calcium, oxygen and phosphate to make a porous material, chemically and mechanically mimicking bone. The Research team says that unlike [metal alloys](#), ceramics and even donor bone, their patented material is low cost, has very good biomechanics, is biocompatible and can be integrated into existing bone, thus properly assisting bone regeneration.

**More information:** "Human bone regeneration from wood: a novel hierarchically organised nanomaterial" in *Int. J. Healthcare Technology and Management*, 2012, 13, 171-183

Provided by Inderscience Publishers

Citation: New study suggests wood as novel material for bone replacement (2012, December 14)  
retrieved 27 April 2024 from <https://medicalxpress.com/news/2012-12-wood-material-bone.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.