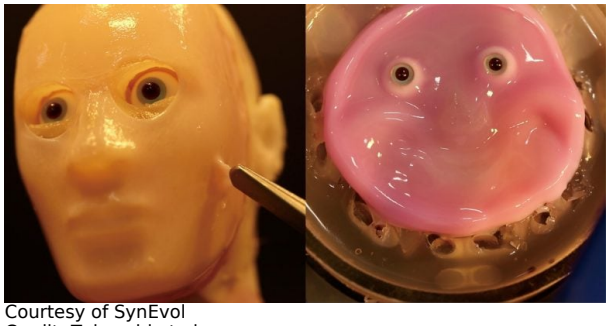
Scientist Created Human Like Skin That Feels and Heals Quickly

Posted by Okachinepa 07/10/2024

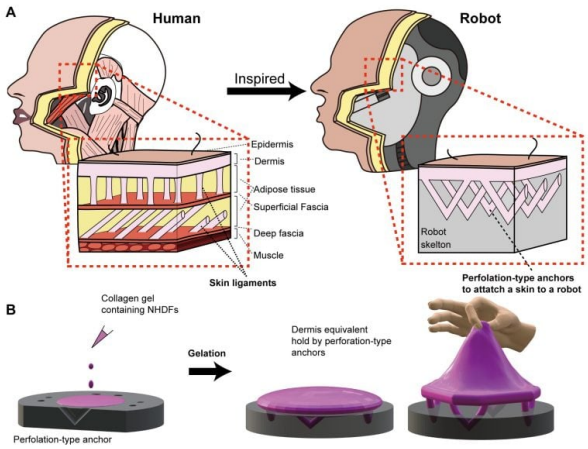


Courtesy of SynEvol
Credit: Takeuchi et al

Japanese scientists have created a technique that allows them to attach manufactured skin tissue to humanoid robots, improving their senses, movement, and capacity for self-healing. Through the use of unique holes, the skin is better able to attach to the robot's mechanical components and move with them. The development of more lifelike robots, cosmetic testing, and medical research could all be greatly impacted by these breakthroughs.

Leading the project was University of Tokyo professor Shoji Takeuchi, a pioneer in the field of biohybrid robotics. His lab, the Biohybrid Systems Laboratory, has produced engineered skin that can mend, 3D-printed lab-grown meat, and miniature robots that walk using biological muscle tissue, among other things. Takeuchi felt compelled to advance the concept of robotic skin in order to enhance its qualities and functionalities while conducting research on the final of these goods.

"I felt the need for better adhesion between the robotic features and the subcutaneous structure of the skin during previous research on a finger-shaped robot covered in engineered skin tissue we grew in our lab," Takeuchi said. "We discovered a method to attach skin to intricate structures by imitating human skin-ligament structures and by employing specifically designed V-shaped perforations in solid materials. The skin can move with the mechanical parts of the robot without ripping or peeling away due to the skin's inherent flexibility and powerful manner of attachment.



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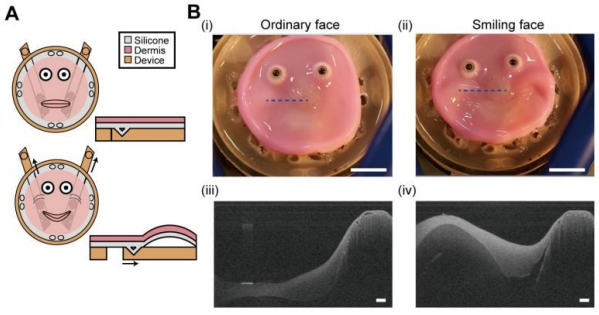
In the past, skin tissue was attached to solid surfaces using devices like tiny hooks or anchors, but these were limited in the types of surfaces that could be coated with skin and may potentially break when in motion. Instead, skin can be applied to almost any shape of surface by carefully designing tiny openings. The team's clever method was to feed a unique collagen gel—which is inherently viscous and challenging to feed into the tiny perforations—through the tiny holes. However, they were able to retain the skin at the questioned surface and gently press the collagen into the small structures of the perforations by employing a widely used plastic adhesion technique known as plasma therapy.



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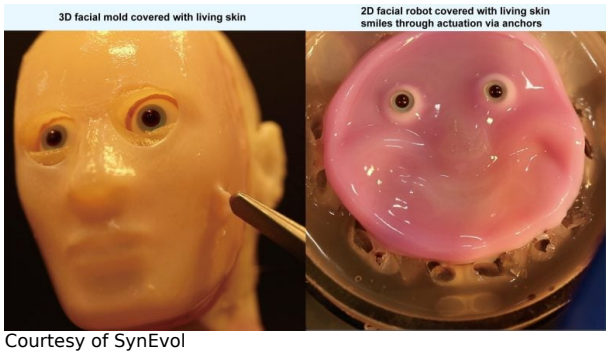
"It is far more difficult than one might imagine for those outside the field to manipulate delicate, wet biological tissues throughout the development process. Takeuchi stated, "For example, if sterility is not maintained, bacteria can enter and the tissue will die." But now that we can accomplish this,

living skin can give robots a variety of new capabilities. The ability of certain chemical-based materials to heal themselves is remarkable; nevertheless, they do not replicate like cells and need external stimuli like heat, pressure, or other signals. Similar to how our own skin heals minor wounds, biological skin also allows for the addition of nerves and other skin organs for sensing and other purposes."



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However, the purpose of this investigation was more than merely proofreading. With this application, Takeuchi and his team want to advance a number of medical research fields. While the concept of an organ-on-a-chip is not very novel and is used in medication development, study on skin aging, cosmetics, surgery, plastic surgery, and other topics could benefit from the usage of something like to a face-on-a-chip. Additionally, robots may be given greater environmental awareness and interaction capabilities if sensors can be installed.

"With the same surface material and structure as humans, we were able to create a face that resembles humans in this study," Takeuchi said. Furthermore, by doing this research, we were able to pinpoint new difficulties, like the need for surface wrinkles and a thicker epidermis in order to appear more human. It is our opinion that adding sweat glands, sebaceous glands, pores, blood vessels, fat, and nerves will result in thicker, more realistic skin. Naturally, movement is just as vital as the material, so incorporating complex actuators, or muscles, within the robot to create human-like expressions is another significant problem. It is very exciting to develop robots that can perceive their surroundings more precisely, heal themselves, and move with human-like agility."
