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The Endeavor to Develop a Bandage Bound Wound Hearing Sensor

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Modifying bandages for the sake of more expedient healing is the newest frontier in making medicine more efficient.

The Endeavor to Develop a Bandage Bound Wound Hearing Sensor

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Cuts, scrapes, scabbing, and bleeding: all issues humans inevitably face in their lives. Everyone has experience with the occasional injury, and when it happens, it is time to bring out the all-important bandages and tape to seal the leaking of precious fluids and hemoglobin-filled cells. For many people, the wound heals after a relatively short period of time, and it's like it never happened. Unfortunately, some more serious wounds take much longer to heal and need more time beneath the sealed protection. Various factors may cause a wound to take a long time to heal or even become trapped in a phase of healing. Wounds that take three months or longer to heal are labeled as chronic. With current limitations, these wounds typically must be uncovered to be inspected for progress in healing; though, a team of researchers hopes to create a solution to replace the process of uncovering wounds to check healing.

Researchers at Heriot-Watt University in Edinburgh have begun looking into a new approach of detecting information about wounds hidden under wraps. With current bandage technology, the only methods of judgement are based on reports of pain and uncovering the wound when the doctor believes a check should occur. Dr. Michael Crichton, a biomedical engineer at the university, leads their Soft Tissues and Biomedical Devices Lab in the hope of accomplishing two goals: understanding the mechanics of wound healing and creating sensors capable of mapping out the skin beneath the bandage.

Dr. Crichton states that while plenty of research has been done on the properties of wounds, there is a lack of knowledge on the healing of wounds on the microscale. In order to gain this desired understanding, doctoral student Sara Medina-Lombardero utilizes pig skin, an acceptable analogue for human skin, by making tiny incisions in the skin and running them under the lab's Optical Coherence Tomography system. With the 3D visualization, she can analyze each layer of the skin to see how it was affected by the cut. Medina-Lombardero describes her part in the project as aiming "to know how each layer of skin contributes to its mechanical properties". Once the mechanics of a wound can be understood, a sensor making use of the knowledge can be derived.

With the knowledge to be gained from the analysis, the researchers hope to produce a grain-sized sensor, which can be embedded in bandages to alert staff when healing is not occurring properly, allowing them to adjust when necessary. The sensor will be designed to make small vibrations that will test the strength of the skin beneath and receive the reverberations back. It is believed that the speed in which this transmission and reception occurs can be used to determine the strength of the skin beneath. Tracking the changes in the sensor's output and comparing it with the data gathered on how healing skin resonates will enable doctors and clinicians to see the progress of the healing process.

Through their efforts, members of the Heriot-Watt's Soft Tissue Lab hope to revolutionize how medical professionals monitor long term wound healing by cheapening and optimizing the process of checking wounds. The researchers also hope that the technology may be applicable in other fields outside of wound treatment, such as providing noninvasive methods of analyzing organs with similar structures to skin. As the two-year project continues, researchers are getting closer to the results they hope to see.

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