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Camera reveals blood circulation

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A device developed by Aïmago, a start-up in EPFL's Science Park, shows how blood is circulating in the skin. It already facilitates the work of burn specialists and plastic and reconstructive surgeons at CHUV.

Burn specialists look at the quality of dermal blood circulation to judge the extent and severity of a burn. On the screen of the device developed by Aïmago, a start-up company located in EPFL's Science Park, the microcirculation in the tissue is displayed in real time. It's a gain in both time and reliability for the specialist. "In comparison, the expert's eye or the "needle test" to measure sensitivity only provide an accurate assessment of the severity of the burn about two times out of three," notes the company's leader, Michael Friedrich. Other areas of medicine such as plastic surgery, wound healing, diabetes, rheumatology and neurosurgery could also benefit from this innovative device.

The EasyLDI device, invented in EPFL's Biomedical Optics Laboratory (LOB), is extremely simple to use. Its screen faces the user, and on the other side is a camera. The whole thing is mounted on a flexible arm. When the device is held above the zone in question, the microcirculation is displayed like a topographical map. The color variations reveal differences in microcirculation intensity over a volume of skin some 50 cm2 in area and 1-2 mm deep. Heartbeat and vasomotion are also displayed. Covered with a sterile sleeve, the device can also be used in the operating room.

The apparatus is based on laser Doppler technology, a method that has already been proven reliable in evaluating wound depth. But existing

machines are bulky and complicated to use. In this device, a laser beam is reflected by red blood cells and static tissue. The Doppler effect (the frequency lag between the emitted and reflected light beam) is transformed into color variations on the interface using a camera developed in the Biomedical Optics Laboratory that can obtain 20,000 images per second and analyze them pixel by pixel.

In late August, EPFL professor Theo Lasser from the LOB and Friedrich (Aïmago) were awarded the 2011 CTI Swiss MedTech Award. Their project was selected to win the 10,000 Swiss franc award by an expert audience of around 550 representatives from the fields of research and industry, who designated it the best of the three nominated projects.

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