

Waterproof skin patch allows for monitoring biometrics during water sports

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An electronics-enabled epidermal microfluidic system mounted on the back of the hand transmits skin temperature to an external smartphone via NFC and displays notifications to the user via an on-board LED. Credit: John Rogers Research Group

An international team of researchers has developed a skin patch for monitoring a person's biometrics that functions underwater. In their paper published in the journal *Science Advances*, the group describes the patch, how it works and its possible uses.

The [patch](#) has [tiny holes](#) on its underside that [sweat](#) penetrates (it is actually pushed in by the [sweat glands](#))—tiny channels carry the sweat to tiny chambers. Each chamber serves as an individual miniature test lab. One chamber tests for fluid levels, another for sweat loss, another for chloride concentrations, and so on. It is based on [another patch the team created](#) for use on land.

The patch is completely waterproof and does not need batteries—it draws power from radio waves in the surrounding environment. In similar fashion, data stored on the device can be transferred to a device such as a smartphone using near-field

communications.

The patch is intended for people who compete in the water—polo players, swimmers, triathletes and others. The researchers point out that metabolism varies between athletes as does sweat and its components. Monitoring important components in sweat can give athletes, their trainers and coaches a clear view of how well the body is holding up while an [athlete](#) is competing. The device was made to be watertight by employing a strong skin-safe adhesive—and by keeping it small and thin. It has a width of just 30mm. The patch is also flexible—a must for athletes who rely on body movement. The group notes that the device can also be used in other applications, some of which may not be in the water.

The researchers have already field tested their device in a wide number of applications—from bike riders to swimmers and triathletes—some of whom were engaging in real competitions. The team reports that the results have been encouraging. Some of the devices were found able to hold up to two hours of swimming. The device is not yet for sale, but the team is working with a company called Epicore Biosystems to make a viable commercial product.



Sweat loss is determined via visual assessment of the filling extent of sweat as colored by a food dye. Credit: John Rogers Research Group

More information: Jonathan T. Reeder et al. Waterproof, electronics-enabled, epidermal microfluidic devices for sweat collection, biomarker analysis, and thermography in aquatic settings, *Science Advances* (2019). DOI: [10.1126/sciadv.aau6356](https://doi.org/10.1126/sciadv.aau6356)

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