

## Artificial pattern mimics nature

As people age, they may find their wrinkled skin neither pleasing nor useful. But biological systems take advantage of such patterns. For example, wrinkles on the inner surface of the human intestine and on the surface of the brain have evolved to improve digestion and intelligence, respectively. To make wrinkle patterns, inhomogeneous stress fields in the intestine, brain, and other biological tissues induce mechanical instabilities that buckle and deform the tissues as they grow in volume. Although theoretical studies sometimes assume that tissues start with stress-free configurations, that's not the case for many living ones.

Yangkun Du and Michel Destradre of the National University of Ireland Galway and their colleagues have now quantified the effects of

initial stress fields on soft materials. They grew a pattern on a two-dimensional hydrogel. By then forming it into a tube and shrink-fitting it inside a ring of rubber, the researchers created a compressive stress in the hydrogel and a tensile stress in the rubber. The initially smooth hydrogel became unstable within an hour; this image shows the pattern that formed on the inner surface of the hydrogel after 24 hours. In comparison, a stress-free tube the researchers made never achieved the same degree of pattern complexity. The initial stress turned out to be controllable, which could help scientists who are trying to make artificial tissues. (Y. Du et al., *Soft Matter* **15**, 8468, 2019. Image courtesy of Congshan Liu, Zhejiang University.)

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