# The Magic Pants that Always Fit

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## The research story

The inner surface of animal cells is covered by a filamentous scaffold called the cortex, which is composed of micro filaments connected by proteins such as molecular motors. The filaments are made by assembly of a protein called actin, and typically can reach a length of a few micro-meters. The connecting proteins are typically much smaller, but some molecular motors can be up to hundreds of nano-meters in size.

## The image

This picture shows a cortex covering the entire cell, where the filaments are connected to each other by invisible molecules. It is a numerical model made with Cytosim, an Open Source software constructed to simulate cellular structures such as this one (www.cytosim.org). The cell was here subjected to a virtual “osmotic shock” in the form of an overall volume decrease. Wrinkles formed as the shell was compressed, as depicted on the image. In a real living cell, however, such wrinkles would rapidly vanish because the filaments naturally disappear while new ones are created. Like many other structures in the cell, the cortex is always dynamic and can thus readily readjust following a change of volume. Thus it fits the cell always perfectly! Many other cellular structures are similarly dynamic allowing them to adapt to conditions that are often different between various cells in the body.




F. Matthäus et al. (eds.), *The Art of Theoretical Biology*, https://doi.org/10.1007/978-3-030-33471-0_5