T*erminator 2* is the one with the T-1000, a shape-shifting robot who can mimic human behavior. It is made of liquid metal. It is infinitely flexible.

That's what science fiction looked like in 1991. Today, scientists have taken robotics into biology. Instead of creating human-like forms, they are using contemporary nanotechnology to make tiny "biological machines" that can enter the blood stream and execute a range of tasks. They can do the work of cells, and often do it better.

FYI: one nanometer is one billionth of a meter.

Dr. Rashid Bashir is a professor of bioengineering and runs the Micro and Nanotechnology Laboratory at the University of Illinois at Urbana-Champaign. He and his colleagues have created something they call a “bio-bot,” a 7mm-long hydrogel structure made with a 3-D printer that is attached to cardiac cells taken from a rat. Or, as he puts it, a cantilever structure is seeded with a sheet of contractile cardiomyocytes.

These robots move at 236 micrometers per second, propelled forward by the pulse of a rat’s heart cells. They could be programmed to detect toxins and then release the right chemicals to neutralize them. They could, say, dispense a drug when they detect high blood pressure, high cholesterol, or high glucose. They could swim through water, climb stairs, detect explosives, or combat diseases. The potential applications are endless.

Embedded within the hydrogels could be cell-factories. In other words, these biological robots could have their own assembly line—they could generate their own repairs or could adapt to optimize their own performance.

It becomes a bit difficult to say where machinery ends and consciousness begins, and vice-versa—both are interwoven down to the microscopic scale. In the words of Thomas Bayrle, we're a society "hanging on the IV drip of the machines."

Dr. Rashid Bashir speaks about biobots and bionanotechnology on May 13th, 2013, at the invitation of Research Fellows Emily Edison, Coco Lopez, and Isabella Vitti.