

## Tiny turbine in human artery harvests energy from blood flow

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A turbine in an artery could harvest enough energy from blood flow to power implanted medical devices. Image credit: Alois Pfenniger, ARTORG Cardiovascular Engineering, University of Bern, Switzerland.

(PhysOrg.com) -- A small turbine located inside a millimeters-wide human artery could harvest enough energy from blood flow to power implanted medical devices, such as pacemakers and drug-delivery pumps. The concept has been presented by researchers at the University of Bern and the Bern University of Applied Sciences during the Microtechnologies in Medicine and Biology conference in Lucerne, Switzerland, earlier this month.

As mechanical engineer Alois Pfenniger of the University of Bern explained, the heart produces about 1-1.5 watts of hydraulic power,



while a <u>pacemaker</u> needs just 10 microwatts to operate. The researchers designed and tested three turbines inside a small tube that mimics the internal thoracic artery. The most efficient of the three turbines generated 800 microwatts, which is more than enough to power <u>pacemakers</u> and other devices.

The turbines could also be used to power blood-pressure sensors, neurostimulators, and glucose meters, among other medical devices. Powering these devices with the body's own energy has several advantages, such as eliminating the need for replaceable batteries and cables attached to an external power source. An independent power source means that the devices could also be miniaturized, allowing surgeons to implant them in ways that improve blood flow and reduce side effects. Smaller devices could also accommodate more diagnostic features and wireless communications, which researchers are continuously developing.

One of the biggest concerns with putting a turbine in an artery is the possibility of blood clots. The three test turbines all produced some turbulence, which could disrupt blood flow. The researchers plan to test new designs using computer simulations to minimize this turbulence.

The turbine design is not the first device that would harvest energy from tiny movements in the body. As noted by *IEEE Spectrum*, other devices have been demonstrated that harvest energy from changes in blood pressure, pulsing arteries, moving organs, and temperature gradients.

More information:

via: IEEE Spectrum

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