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# A Wireless Implantable Micropump for Chronic Drug Infusion Against Cancer

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## Research highlights

- A wireless implantable infusion pump for chronic drug administration against cancer
- Micropumps delivered a single bolus daily for several weeks with  $\mu\text{L}/\text{min}$  flow rates
- Greater separation and misalignment of transmitter and receiver affect performance
- Examined pumping under different pressure, viscosity, and temperature conditions
- Pumps provided consistent and reliable performance in simulated *in vivo* conditions

**Abstract.** We present an implantable micropump with a miniature form factor and completely wireless operation that enables chronic drug administration intended for evaluation and development of cancer therapies in freely moving small research animals such as rodents. The low power electrolysis actuator avoids the need for heavy implantable batteries. The infusion system features a class E inductive powering system that provides on-demand activation of the pump as well as remote adjustment of the delivery regimen without animal handling. Micropump performance was demonstrated using a model anti-cancer application in which daily doses of 30  $\mu\text{L}$  were supplied for several weeks with less than 6% variation in flow rate within a single pump and less than 8% variation across different pumps. Pumping under different back pressure, viscosity, and temperature conditions were investigated; parameters were

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