Ultrasonically Actuated Needle Pump System

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Technology description

Miniaturized needle systems that do not puncture capillaries are being developed in part due to problems that arise from repeat sampling, as in the case of blood sugar monitoring by diabetics. It has been shown previously that ultrasonically actuated, single needle devices will pump fluid from the distal to the proximal needle end. However, when these single-needle devices are inserted into the skin, vibrations on the needle are dampened, reducing the efficiency of fluid pumping. UW-Madison researchers have developed a needle pump system composed of two needles – an outer, stationary tubular needle having a penetrating tip and a hollow bore, and an inner tubular needle that is mounted in the bore of the outer needle. The dimensions of the device are only 1.6 cm by 1.5 cm. The inner needle is ultrasonically vibrated by an ultrasonic actuator without vibrating the outer needle.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an ultrasonically actuated needle pump system that can be used to extract controlled amounts of fluid from areas such as interstitial spaces with minimal disruption to the body tissue.

Application area

Extraction of small amounts of fluid
Blood sugar monitoring

Advantages

The vibration of the inner tubular needle results in highly efficient pumping of fluid from the distal to the proximal end of the needle system.
The outer needle shields the vibrating inner needle from contact with tissue so that the vibrations are not dampened.
The device may also be used to pump fluid from a container at the distal end to an open proximal end to efficiently atomize liquid.
This device could also be used to develop a significantly improved glucose monitor that would penetrate only 100 micrometers into the skin.

Institution

Wisconsin Alumni Research Foundation

Inventors

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