

Pneustep Motor Makes MRI Guided Organ Biopsies Possible

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On April 6, 2007, engineers at John Hopkins University released the Pneustep Motor. This motor makes MRI guided organ biopsies possible by using a robot. This step motor is made of plastics, ceramics, and rubber. It is the first MRI safe motor to be created. It can be considered MRI safe because it is made without metal or electricity. Metal is unsafe in the MRI scanner because of the strong magnetic interface and if electric current was to be used it would distort the images. Therefore, the step motor is driven by air and light. It contains three pistons, which are connected to a series of gears. The gears are turned by airflow. This motor drives the robotic device, used to collect tissue samples.



The robot is also nonmagnetic and dielectric, making it MRI safe as well. It is powered by the step motor. The robot is remote controlled using a computer. It is guided by an MRI, which is the preferred method of soft tissue imaging. The robot moves slowly but very precisely. It increases accuracy in collecting tissue samples for biopsy.

The patient is put under general anesthesia before undergoing this procedure. The robot is then placed into the MRI scanner with the patient. A computer controls the motor and the robot to move around using the images of the MRI as a guide. Precision of motion of the robot is as

fine as 50 micrometers. The needle for biopsy comes within a millimeter of its target. The motor inside of the robot has fiber optics, which feeds information back to the computer in real time. This gives the robot guidance for precise motion and can help to see if the patient needs to be re-adjusted. This new technique will eliminate the need for a second biopsy due to its accuracy. The device is considered to be more accurate than human hands. It will take the place of traditional biopsies done by physicians. This procedure is still in the stages of preclinical trial. There has been a successful experiment done using 6 step motors to power the robot to access the prostate gland of a patient thought to have cancer. The future of this device looks very promising.



Sources:

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