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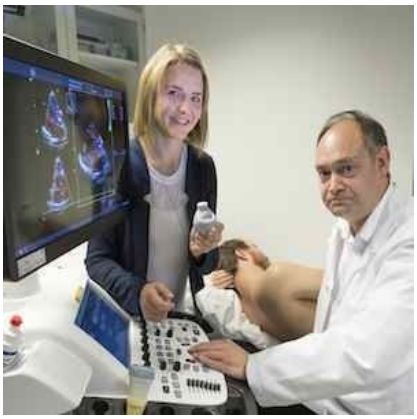
On-Screen Models Predict Effects of Heart Surgery



Research scientist Sigrid Kaarstad Dahl and her colleagues have generated on-screen models of a patient's beating heart and have stimulated patient-specific blood flow samples in order to predict the effects of heart surgery.

The on-screen heart models can enable cardiac specialists and engineers to run simulations of a variety of surgical procedures and to predict the effects of an operation which could potentially save lives.

Approximately ten percent of cardiovascular operations are unsuccessful. Tools and technologies that could reduce this risk would be extremely useful and that is why Norwegian clinicians at Haukeland and Oslo University Hospitals, St. Olav's Hospital and the University Hospital of North Norway are working closely with SINTEF researchers to develop something that could help achieve this goal.

"It means that we can simulate an operation in advance and say something about what procedures will be of most benefit to the patient in question", says Chief Surgeon and cardiologist Stig Urheim, who works at Haukeland and Oslo University Hospitals.

Cardiovascular disease is one of the most common causes of death. It is also the most expensive disease for society as a whole. It is expected that the number of patients suffering from cardiovascular disease will continue to increase in the years to come.

A major cause of heart failure is heart valve malfunction that is usually treated by repairing the valves or implanting prosthetics. No one can predict which treatment technique will produce the best outcome for a patient. Many valve repair procedures remain unsuccessful and require a new operation further reducing the patient's quality of life, increasing hospital admissions, levels of medication and patient mortality. Unsuccessful procedures also increase public expenditure and result in longer waiting times.

By using an on-screen display of a patient's heart, clinicians can use simulation tools to to take the differences in patients' hearts into account before implanting the prosthetic valves.

"If a valve has to be repaired, the simulation tool will provide the doctors with useful information", says Dahl. "We have not had access to this type of detailed information before", she says. Such information will help to prevent the development of adverse flow patterns that can lead to new cardiac disease and damage.

The researchers are now focusing on the application of heart and valve models and their goal is to streamline software in order to make it easier for the technique to get established.

Source: SINTEF

Image Credit: Thor Nielsen

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