Heart breakthrough using 3-D computer model

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Scientists have used a computerised 3D model of the heart to work out the cause of heart silence, a condition that causes the upper chambers of the heart to lose their power to contract.

The condition usually occurs following a successful operation to correct an abnormally fast heart rate -atrial fibrillation- and is one of the leading triggers of strokes and heart attacks.

The findings, from academics at The University of Manchester, could open the door to new treatments for the condition, potentially saving hundreds of lives every year. Atrial fibrillation is the most common cardiac electrical disorder that happens at all ages, but has higher incidence in older people, so is very likely to become a lot more common as the population ages.

Atrial fibrillation is associated with erratic electrical waves in the upper champers of the heart, causing uncoordinated and weak muscle contraction in the atria. After surgery correction of atrial electrical waves, however, the muscle can remain relaxed, meaning blood stays in the chamber and begins to clot.

"This is the first time this kind of work has been carried out. It is very exciting research which we think could lead to some new treatments and drugs to help tackle this problem," Professor Henggui Zhang said.

If this clot then travels around the body it can lodge in the heart or brain causing hearts attacks or stroke even when the heart is beating normally again.

The exact cause of the muscle silence in mechanical contraction after successful correction of atrial fibrillation is not known, but this new research has shed light on it, and lead author, Professor Henggui Zhang, believes it could lead to the development of new drugs which will be able

to target the condition.

In a paper published today in the journal *PLOS ONE* the team describe how they modelled the impact of electrical pulses which control the heart contraction going wrong and then looked at the effects of this in four different states. A series of videos shows the impact that these electrical waves have on the muscle contraction in the normal and diseased hearts. Any treatment would target the diseased muscles so they don't stop pumping, allowing blood to flow around the body normally.

Prof Zhang said: "This is the first time this kind of work has been carried out. It is very exciting research which we think could lead to some new treatments and drugs to help tackle this problem.

"Now we know the cause of this muscle mechanical silence it should be easier to develop solutions."

Provided by University of Manchester