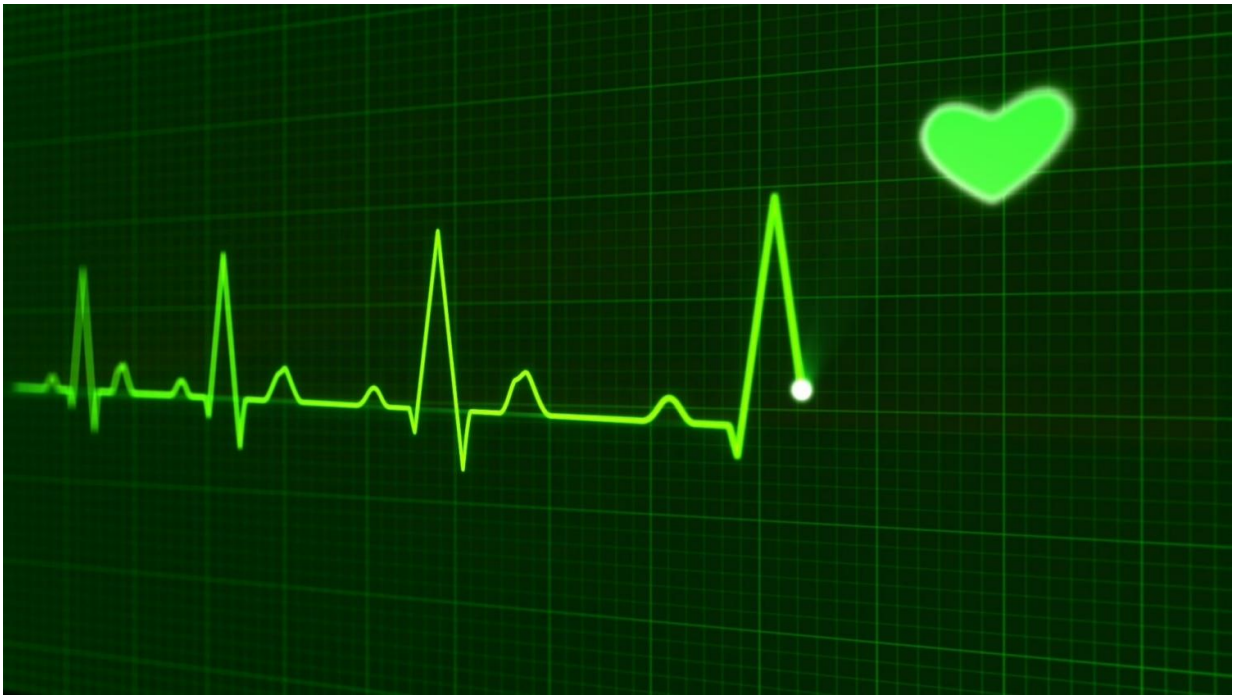
Promising findings for treating damaged heart valves

December 13 2019



Credit: CC0 Public Domain

Aortic valve calcification is a challenging condition for the health service and for the patients concerned. The only treatment currently available is surgery. Mariia Boganova recently defended her thesis which addresses the options available for future pharmacological treatment.

Mechanisms behind the disease

The Russian doctoral research fellow explains that her thesis first looks at the mechanisms behind the disease. She says that there are many similarities between aortic valve calcification and the formation of bone.

The cells in the connective tissue are transformed into bone-forming cells which start to form calcium crystals in the valve sails. In order to study this process more closely, they isolated cells from human valves which were harvested during valve operations—a recognized model for reflecting the basal disease process.

The researchers then looked at the interplay between factors which could contribute towards valve calcification and cell transformation:

- mechanical stress
- inflammation
- biochemical composition of the valve surfaces

They discovered that cells from calcified valves have altered important properties and functions when compared with cells from healthy aortic valves. Cells from healthy valves also have a greater potential for transforming themselves into other different types of cells when compared to cells from calcified valves.

A challenging disease

"Aortic stenosis is the most common heart valve disease which is treated surgically around the world. If left untreated it is a potentially fatal disease. The treatment can also lead to significant complications," explains her senior supervisor Arkady Rutkovskiy.

There is currently no medical or pharmacological treatment available which can stop or prevent the progression of this disease. The only option is surgery, or catheter-based replacement of the aortic valve.

The procedures used for treatment are not without problems and are known for "exchanging one disease with another," since the new biological valves can become re-calcified, while patients with mechanical valves have to take anticoagulants for the rest of their lives.

New treatment method

Mariia Boganova studied the cellular and molecular mechanisms involved in aortic valve calcification which lies behind aortic stenosis, in order to help with the development of a non-surgical treatment for the disease.

"We are proposing potential pharmacological treatment for aortic stenosis which could possibly stop or even reverse the disease process. This treatment is capable of stopping calcification in our cell culture, something which is the first step in trialling potential drugs. We have a long way to go, but we consider that these findings now represent a step forwards in the prevention or treatment of aortic stenosis," concludes Ms Boganova.

Provided by University of Oslo