PLUGGING HOLES IN HEARTS

It’s an open-and-shut case

By Wong Kim Hoh
Senior Writer

LIKE all good researchers, Professor Freddy Boey and his team have identified a gap in the market and are using their considerable skills to plug it – and with striking success, it seems.

The materials science engineer has invented a device made from biodegradable materials that will be a boon for those born with a hole in their heart.

The condition – it is called patent foramen ovale (PFO) – is believed to affect up to one in four people.

It can cause many health complications, including allowing unfiltered blood and fat particles to pass into the arteries and cause blockages.

Prof Boey, who is 54 and heads the School of Materials Science and Engineering in Nanyang Technological University, has come up with a solution. He calls it his “double umbrella device.”

The device is folded and inserted into the patient in the same way a heart stent is inserted. The doctor will make a small opening in a blood vessel in the groin (upper thigh), arm, or neck to insert a thin, flexible tube called a catheter, and guide the device to the heart.

“Once the device is inserted through the hole, one of the ‘umbrellas’ will open on the further end and then pull back to cover that side of the hole.”

He continues: “The other umbrella will then open on the other side of the hole. Both umbrellas are pulled together to close the hole fully.”

The scientist, who has co-founded three companies and developed and licensed several products, including a dual drug-removing stent, then smiles and adds: “The beauty is, after they’ve been closed, endothelial cells will grow over the two layers.”

Endothelial cells are flat thin cells which line the inside surfaces of body cavities, blood vessels and lymph vessels.

“Because they’ve been made of biodegradable materials, the layers will then slowly disintegrate and disappear.”

“So if you have the device implanted as a child, the hole would be patched by the time you grow up, and there would be no more issues.”

He says that currently, devices used to treat hole-in-the-heart conditions are made of non-degradable metallic and synthetic fabric materials.

“We can put stuff in the body quite cleverly but the stuff itself often becomes the problem,” adds Prof Boey.

He is referring to complications arising from device erosions and potential obstructed access for future procedures.

Prof Boey and his team came up with their device after a doctor told them of the inadequacy of current devices.

They took two years to develop it, using funds from a $10 million research grant he received from the National Research Foundation.

The “double umbrella” has been used successfully in animal and clinical trials and will be transplanted in the first human patient in India later this year.

“We are targeting some time between June and December,” he says, adding that a team of surgeons – led by well-known cardiologist Prasada Rao from India’s Apollo Hospitals – has already been assembled for the operation.

Prof Boey will soon form a company to patent the device.

“We know what we have is very strong.”

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Professor Freddy Boey has invented a device made from biodegradable materials that will be a boon for those born with a hole in their heart. PHOTO: NANYANG TECHNOLOGICAL UNIVERSITY