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District Court of Düsseldorf
– Patent Litigation Division –
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We will serve

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In the matter

Boston Scientific Scimed, Inc. (Peterreins Schley) **v.** **Edwards Lifesciences Corp. et al.** (Bird & Bird)

A. On the Defendants' preamble

In their preamble, the Defendants present a number of things confusingly and sometimes even incorrectly. The following clarifying comments are therefore required:

A.I On the company history of the Defendants

The company of Defendant 1 was founded in 1958 and was initially involved in developing a ball-cage prosthesis (see figure in paragraph 4 of the statement of defense), which was implanted into a human for the first time on September 21, 1960. What was not mentioned was

that, back in 1951, in other words almost 10 years earlier, Charles Hufnagel described a ball-cage prosthesis which was implanted in a human for the first time on September 11, 1952. Also left unmentioned in the statement of defense were numerous ball-cage prostheses developed at the same time, such as the Harken-Soroff ball-cage prosthesis (first implanted in March 1960), the Braunwald-Cutter ball-cage prosthesis (first implanted on March 11, 1960), the Magovern-Cromie ball-cage prosthesis (first implanted in 1962), the Smeloff-SCDK-Cutter ball-cage prosthesis (first implanted in 1964) and the DeBakey ball-cage prosthesis (first implanted in 1969).

With reference to their ball-cage prosthesis, the Defendants mention patent specification DE 1 491 148 B filed by the company founders Miles Lowell Edwards and Albert Starr, but this is completely irrelevant to the present proceedings. Firstly, the patent is aimed at a special embodiment of a thimble (see claim 1 and the figures) which is used to stitch the ball-cage prosthesis at the implantation site, the mitral valve. It is therefore a prosthesis that is to be surgically implanted in order to replace the mitral valve. The reference in paragraph number 5 to a similarity between the thimble and the claimed invention is completely unfounded because the claimed apparatus for endovascular replacement of the heart valve does not have a thimble, nor is a seal produced through the stitching. Secondly, the irrelevance of patent specification DE 1 491 148 B is evident simply from the fact that the Defendant did not introduce this document as state of the art in the (ongoing) opposition proceedings before the European Patent Office, nor does it refer to it in its petition for a staying of proceedings.

The founding of the company Percutaneous Valve Technologies (PVT) cannot represent a milestone in the company history of the Defendants either because the Defendant only took over the company in 2004. In addition, PVT was founded back in 1999 and not in 2001 as stated by the Defendant.

In the statement of defense, an attempt is made to give the impression that Defendant 1 developed the first transcatheter valves (see paragraphs 7 to 11 of the statement of defense). However, this cannot be accepted because the development of transcatheter valves had already begun decades before its takeover of PVT and also before the founding of PVT. This is because catheter-based valve prostheses which can assume the function of the aorta valve had been

described, inter alia, back in 1965 by Davies, in 1971 by Moulopoulos, in 1976 by Phillips and in 1977 by Boretos and Poirier.

In 1989, the Danish cardiologist Henning Rud Andersen managed to implant an aorta valve prosthesis that permanently remained at the implantation site in a pig using a catheter. In the years thereafter, various valve prostheses were developed, such as the Pavcnik transcatheter ball-cage prosthesis (1992), the Stevens valve prosthesis (1994) and the Sochman transcatheter disc prosthesis (2000), which were likewise tested in an animal model. In 2000, Philip Bonhoeffer finally managed the first implantation of a transcatheter valve to replace the pulmonary valve in a human. Only two years later, on April 16, 2002, Cribier, one of the founders of PVT, carried out the first implantation of a transcatheter valve to replace the aorta valve in a human. And only after numerous further implantations in humans did the Defendant take over the company PVT in 2004.

The assertion made by the Defendants that Cribier developed "transcatheter aorta valve implantation" is therefore incorrect. Although he may have been the first to carry out such surgery on a human, the method itself had long been known by that time and had been established in an animal model.

The Defendants therefore played a much smaller part in the development of transcatheter heart valves than their statements suggest. At best, the Defendants can be credited with successfully marketing the transcatheter aorta valve developed by Cribier which was initially distributed by the Defendants as the Cribier-Edwards Valve.

A.II On the company history of the Plaintiff

Boston Scientific Corporation is one of the world's leading medical engineering companies and develops innovative products, amongst other things, for the diagnosis or treatment of cardiovascular, stomach, lung, urological, gynecological and neurological diseases. Boston Scientific, as an innovative company, is regularly named as being at the forefront in statistics published by the European Patent Office. For example, in 2015, with 260 applications, Boston Scientific was ranked 6th in the field of medical engineering and, with 173 granted patents, was ranked 46th out of all filers of European patent applications.

In 2011, Boston Scientific took over the company Sadra Medical founded in 2003 and then made the Lotus valve prosthesis ready for the market.

A.III On the problem of paravalvular leakage

One of the main problems that can arise after implanting heart valve prostheses is that, unlike healthy heart valves, they do not completely prevent the backflow of blood. Instead, because of leaks, a slight backflow of blood occurs. The backflow may be through the valve prosthesis itself (what is referred to as "transvalvular leakage") or through spaces between the valve prosthesis and the aortic annulus (what is referred to as "paravalvular leakage") and may occur with heart valve prostheses which are surgically implanted in exactly the same way as with transcatheter valves.

In the case of valve prostheses which are surgically implanted, the problem of paravalvular leakage was largely solved by improving the fit of the thimble. However, this type of solution is not possible with transcatheter valves because they do not have a thimble and they are also supplied with the smallest possible diameter on a catheter.

The company Sadra Medical taken over by Boston Scientific Corporation carried out intensive research early on in an attempt to find solutions to prevent or reduce paravalvular leakage in transcatheter valves. PCT application WO 2005/065585 A1 ("Salahieh") which was published on July 21, 2005 and underlies the patent in suit describes a number of possible ways of sealing a transcatheter valve against paravalvular leakage, including a seal which bunches up and sacs arranged around the outside of the prosthesis.

A seal developed by Sadra Medical to prevent paravalvular leakage was described in the scientific literature in 2008. The seal referred to as “Adaptive Seal Technology” was described in the article entitled "Percutaneous Implantation of The First Repositionable Aortic Valve Prosthesis in a Patient With Severe Aortic Stenosis" by Lutz Buellesfeld et al. published in the journal "Catheterization and Cardiovascular Interventions" on March 24, 2008. This article and a German translation thereof are submitted as:

– Exhibits PS8a and PS8b –.

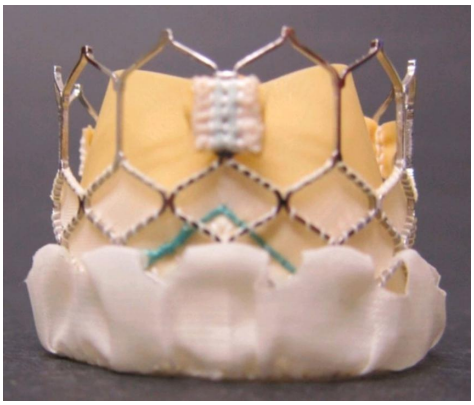
It says in this article that a paravalvular leakage occurs in up to 47% of cases owing to incomplete paravalvular sealing (page 580, middle of the right-hand column). In order to solve this problem, a flexible seal around the outer surface of the lower part of the prosthesis is described (page 581, left-hand column, last paragraph):

> *"At the outer surface, the lower part of the prosthesis is surrounded by a flexible sealing membrane (Adaptive Seal™) made of polyurethane, which fills potential gaps between the prosthesis and the native valve in the final compressed state of the device to minimize or even eliminate paravalvular leakage."*

The Lotus valve prosthesis, which uses Adaptive Seal Technology, has had CE approval since October 2013 and is extolled in the scientific literature for its extremely efficient sealing against paravalvular leakage.

In the latest generation of the Sapien valve prosthesis, the Sapien 3 valve prosthesis contested here, Defendant 1 has now also added a flexible seal around the lower part of the outer surface. The previous version, Sapien XT, which is currently still being marketed by the Defendants, has no such seal around the lower part of the outer surface:

Sapien XT



Sapien 3

This change and the effects thereof are described as follows in the approval documents of the US licensing authority the FDA (available at http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/Recently-ApprovedDevices/ucm455223.htm):

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