

## Endothelialisation of Cardiovascular Implants—The Open Question

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Nowadays, cardiovascular implants are employed for many indications and at almost every location throughout the cardiovascular system. Beside the surgical route, many other ways and methods have been developed for bringing the implant to its destiny in the human body. Heart surgeons, vessel surgeons, neurosurgeons, radiologists, cardiologists and pediatric cardiologists routinely perform implantations of a large variety of devices into blood vessels or into the heart.

But independently of which implant was implanted where or how, and who performed the procedure: the implant is and remains a foreign body. Foreign body surface exposure to the bloodstream is inevitable. And that means that there is a risk of superficial thrombus formation and subsequent embolisation with possible organ damage [1]. In this context, re-endothelialisation of cardiovascular devices following implantation is of major relevance since presence of endothelium is considered the natural and most effective prevention of superficial thrombus formation [2]. But the time gap after an interventional procedure until re-endothelialisation has taken place has to be bridged in order to minimize the risk of thromboembolic complications. This is why antiplatelet therapy is usually given for weeks or months although guidelines are missing except for prophylaxis against thrombus formation after coronary stent implantation [3,4], or after vascular bypass surgery [5]. For all other implants and indications, the best mode and duration of anticoagulant or antiplatelet therapy is largely unknown.

With intent to find the right way to sufficiently prevent thrombus formation on the surface of cardiovascular devices, the following question has to be answered: What is the time course of re-endothelialisation?

Most data from histological examinations of cardiovascular implants demonstrate that re-endothelialisation does occur. But there is little information on the time course of this process. Most authors state that formation of superficial endothelium on vascular foreign bodies happens within three to six months [6-8]. But we know that thrombus formation can definitely occur later [9-11].

What is to do? All implants that happen to be explanted should be carefully evaluated with the question of endothelialisation in

order to better understand mechanisms and the time course of re-endothelialisation. That would give a better basis for the decision which patient has to receive antiplatelet therapy for how long. And every patient who has received an intracardiac or intravascular device should undergo clinical and sonographic examinations on a regular basis in order to detect possible problems as soon as possible.

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