IMPACT OF SECONDHAND SMOKE

Secondhand smoke causes ~603,000 premature deaths annually, and 87% of secondhand smoking-related deaths are from ischemic heart disease [Oberg M et al. *Lancet* 2011]. A comprehensive literature review concluded that the CV effects of secondhand smoke are substantial and rapid, and that the effects of even brief exposure (minutes to hours) are often nearly as large (averaging 80% to 90%) as those of chronic active smoking [Barnoya J, Glantz SA. *Circulation* 2005]. Furthermore, they showed that long-term exposure to secondhand smoke at work or home is associated with a 30% increased risk for coronary heart disease (CHD) in adult nonsmokers.

SMOKING CESSATION AS A TREATMENT OF CVD

Smoking cessation is a powerful treatment for established CVD, reducing the risk of CV-related death by 36% and the risk of future cardiac event rates by 50%. These effects are comparable to the 15% to 35% reductions in CV-related death achieved with many widely used pharmacologic therapies (aspirin, β-blockers, ACE inhibitors, statins). Prof. Saade noted that tobacco cessation is one of the most important preventative measures available and that and no other preventive activity produces such significant results from such a small investment in time. The number needed to treat to prevent CV events or death is shown in Table 1.

Table 1. Treating Tobacco Is Effective and Efficient for Reducing Cardiovascular Events and Death

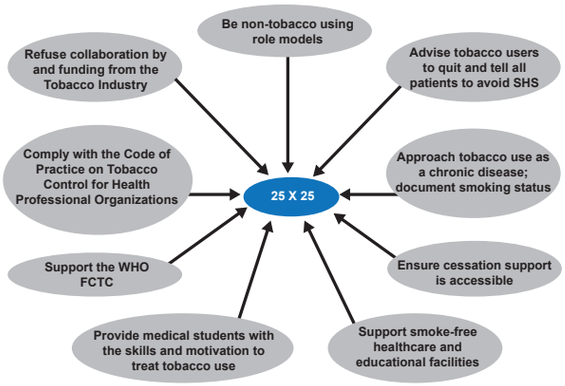
Intervention	Outcome	NNT
Statins	Prevent 1 death over 5 years	107
Aspirin	Prevent 1 MI over 5 years	118
Antihypertensive therapy	Prevent 1 stroke, MI, death over 1 year	700
Cervical cancer screening	Prevent 1 death over 10 years	1140
MD 5 min advice to stop smoking	Prevent 1 premature death	80
+ cessation medication	Prevent 1 premature death	38-56
+ behavioral support	Prevent 1 premature death	16-40

MD=doctor; MI=myocardial infarction; NNT=number needed to treat.

Tobacco treatment is also cost-effective, with cessation counseling and medications costing $2587 per life-year saved [Cromwell J et al. *Health Care Financ Rev* 1997].

Prof. Saade noted that the cardiology team has a professional obligation to address tobacco use and exposure, and it is an essential component of CVD treatment for all patients. Cardiologists have an important role to play, as outlined in Figure 2, in achieving the "25 by 25" CVD goals established by the World Heart Federation.

Figure 2. Role of the Cardiologist to Achieve "25 by 25" CVD Goals



FCTC=Framework Convention on Tobacco Controls; SHS=secondhand smoke; WHO=World Healh Organization.

Reproduced with permission from GA Saade, MD.

Ideal Bioabsorbable Stent Scaffold Is an Achievable Dream

Written by Lynne Lederman

The development of metalic stents improved outcomes after angioplasty by reducing acute vessel occlusion. However, permanent metal-based stents have the potential for negative sequelae after several months in place that couls be overcome if the stents were absorbable. Mohammad I. Kurdi, MBBS, Al Takhassoussi Hospital, Riyadh, Saudi Arabia, reviewed the advantages of having stents "disappear" and discussed profress toward development of the idea bioabsorbable stent.

Reabsorbable stents could reduce or eliminate stent-associated thrombosis, obstructions caused by stent strut side-branches, and restenosis subsequent to strut fracture. Resorption could also allow reestablishment of vascular function. After stent absorbtion, the stented site could be more easily imaged using computed tomography or magnetic resonance and re-treated if necessary, either surgically or via percutaneous coronary intervention (PCI) prodcedures, although the expectation is that repeat interventions would be avoided. Furthermore, bioabsorbable stents could be used to treat pediatric patients, allowing the treated vessels to grow without requiring surgical removal of the stents.

The concept of bioabsorbable stents has been around for over 2 decades, but there are challenge to development. Ideal bioabsorbable stents must be strong enough to function for an appropriate time, have struts that are not too thick, be capable of delivering anti-proliferative drugs to control restenosis, and not cause unacceptable inflammation during breakdown. The long-term use of antiplatelet therapy that is

required with conventional stents, which is expensive and does not eliminate all late-occurring thrombosis, could be avioded with bioabsorbable stents.

Features of five of the bioabsorbable stents in development are listed in Table 1.

Table 1. Bioabsorbable Stents in Development

Stent	Features	Advantages	Drawbacks
Igaki-Tamai bioabsorbable stent	PLLA zig-zag helical coil with straight bridges	During absorption, hydrolysis of lactide units produces lactic acid that is metabolized to carbon dioxide and water; radiolucent with radio-opaque markers	Strut 170 microns, thicker than contemporary metallic stents; cumbersome to use
Bio-absorbable magnesium stent (Biotronik)	Laser cut from tubular magnesium WE-43, sinusoidal in-phase hoops linked by straight bridges	Balloon-expandable; radial strength at implantation similar to stainless steel stents; no stent thrombosis; completely absorbed	Strut 165 microns; radiolucent, no radio-opaque markers; placement challenging; radial support lost early; no antiproliferative drug release; high rate of restenosis
BVS Everolimus-eluting bioabsorbable PLLA stent (Abbott Vascular)	PLLA backbone contains and controls release of antiproliferative drug everolimus; different polymerization than Igaki-Tamai	Release rate of everolimus (80% by 30 days) similar to that of Xience V metallic stent and similar low internal obstruction; strut thickness and crossing profile (1.4 mm) similar to those of Cypher stent	Radial strength at body temperature lower than many metallic stents
Bioresorbable coronary stent (REVA Medical)	Absorbable tyrosine-derived polycarbonate polymer metabolizes to amino acids, ethanol, carbon dioxide	Modifiable absorption time; balloon-expandable without distortion; iodine for radio-opacity	200 micron struts are thick with 1.7 mm crossing profile; side effects include Q-wave myocardial infarctions, target lesion revascularization
Bioabsorbable Therapeutics stent	Repeating salicylate molecules linked by adipic acid molecules; elutes sirolimus and also releases salicylic acid	Salicylic acid expected to counteract inflammation	200 micron struts. 2.0 mm crossing profile caused intimal hyperplasia leading to re-design

BVS=bioresorbable vascular scaffold; PLLA=poly-L-lactic acid.

To summarize, the ideal bioabsorbable stent should be easy to handle and implant, and be detectable by imaging to ensure accurate post-dilatation and placement of additional stents without gaps or overlaps. Having a detectable absorbable stent also means that complete resorption can be confirmed. In addition, at implantation, bioabsorbable stents should have an initial strength similar to that of conventional metal stents and be able to maintain this strength for sufficient time to help overcome the early negative remodeling forces that occur soon after PCI, this negative remodeling is the main cause of restenosis after balloon angioplasty. Stenting via PCI also causes an intimal hyperplastic or excessive healing response, hence the need for a stent that is capable of releasing antiproliferative drugs. Ideally, repair with a bioabsorbable stent would achieve and maintain vessel movement, increase blood vessel lumen size, and produce a reduction in plaque area. In addition, it would be desirable to regain appropriate physiologic responses to exercise and the ability to dilate in response to local ischemia in healed arteries.

The ideal bioabsorbable stent should also result in a healed, normally functioning vessel with no foreign body (stent) remaining, and no restenosis or late thrombosis development. Early encouraging results, particularly the results from the bioresorbable vascular scaffold everolimus-eluting bioabsorbable poly-L-lactic acid stent, although they require confirmation in larger clinical trials in patients with complex lesions, suggest the ideal bioabsorbable stent can be developed.

Therapeutic Strategies for Hemodynamic and Circulatory Support After PCI

Written by **Mary Mosely**

Treatment strategies for ST-segment elevation myocardial infarction (STEMI) utilize both pharmacological therapies and devices designed to restore coronary blood flow. While these therapies are generally effective, a proportion of patients with STEMI will develop cardiogenic shock, one of the leading causes of inhospital death post MI. Despite an optimal pharmacomechanical approach, revascularization, and hemodynamic support, the mortality in patients with STEMI complicated by cardiogenic shock remains high, said Hany Eteiba, MD, University of Glasgow, Glasgow, Scotland.

Prof. Eteiba reviewed effective and active circulatory support strategies that can be used in patients with cardiogenic shock. Extracorporeal membrane oxygenation (ECMO) and left ventricular assist device (LVAD) are two of these approaches and Prof. Eteiba discussed how these devices can be utilized in clinical practice.

Hemodynamic support for patients with acute myocardial infarction complicated by shock can be provided through a variety of available devices (intraaortic ballon pump, Impella, Tandem Heart, etc) that work to increase cardiac output.

Circulatory support can also be provided by ECMO or a LVAD. ECMO is performed by obtaining venous and arterial access and does not require a sternotomy. ECMO can serve as a bridge to recovery, bridge to another