Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.

Local drug delivery has revolutionized the percutaneous treatment of coronary artery disease. Though many forms of local drug delivery are used, the most significant advance in this vascular bed relates to reductions in restenosis after DES implantation. Interest in translating these successes of local drug delivery from the coronaries to the peripheral vascular system to treat vascular disease. The aims are to optimize therapeutic efficacy by direct drug administration and to minimize untoward effects associated with systemic delivery. This is accomplished in humans with drug-eluting stents (DES), drug-coated balloons (DCB), and direct catheter delivery.
follow-up from 4 to 19 months, angiographic restenosis of >50% is reported to be present in 4.8% to 21.4%, though not all subjects in these studies received imaging surveillance. Ogilvy et al26 have suggested that DES may reduce rates of restenosis after vertebral angioplasty. For intracranial interventions, no procedural failures have been reported. Complications have been reported in up to 25% of procedures. No angiographically significant restenosis has been identified during follow-up extending to 14 months.17–25

Table 2. Reports of PES Implantation in Visceral Arteries

<table>
<thead>
<tr>
<th>Visceral Arteries: Renals and Mesenterics</th>
<th>Patient(s)</th>
<th>Follow-Up</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Granillo28 (2005)</td>
<td>1</td>
<td>3 mo</td>
</tr>
<tr>
<td></td>
<td>Kakkar29 (2006)</td>
<td>1 (ISR)</td>
<td>6 mo</td>
</tr>
<tr>
<td></td>
<td>Misra30 (2008)</td>
<td>11</td>
<td>22 mo</td>
</tr>
<tr>
<td>Mesenteric</td>
<td>Visconti31 (2008)</td>
<td>1 (celiac ISR)</td>
<td>9 mo</td>
</tr>
<tr>
<td></td>
<td>Cardaioli32 (2007)</td>
<td>1 (SMA ISR)</td>
<td>8 mo</td>
</tr>
</tbody>
</table>

ISR indicates in-stent restenosis; BMS, bare metal stent; SMA, superior mesenteric artery; and CT, computed tomography.

Table 1. Paclitaxel Use and Cerebrovascular Disease

<table>
<thead>
<tr>
<th>Study</th>
<th>Total Patients/Vessels</th>
<th>Vessels Treated</th>
<th>Procedural Success/Complications (%)</th>
<th>Mean Follow-Up, Months</th>
<th>Long-Term Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharma21 (2006)</td>
<td>1/1</td>
<td>Vertebral</td>
<td>100/0</td>
<td>6</td>
<td>Patent on CTA</td>
</tr>
<tr>
<td>Gupta18 (2006)</td>
<td>59/62 (74% received PES; data based on DES type not provided)</td>
<td>Vertebral (31), IC vertebral or basilar (18), EC internal carotid (5), IC internal carotid (8)</td>
<td>95/3</td>
<td>4</td>
<td>4.8% With restenosis &gt;50%</td>
</tr>
<tr>
<td>Lin19 (2008)</td>
<td>11/11 (8 PES)</td>
<td>Vertebral</td>
<td>100/0</td>
<td>18.7</td>
<td>All clinically asymptomatic</td>
</tr>
<tr>
<td>Vadja23 (2009)</td>
<td>48/52</td>
<td>Vertebral</td>
<td>100/0</td>
<td>7.7</td>
<td>12% With restenosis &gt;50% on angiography</td>
</tr>
<tr>
<td>Yu25 (2009)</td>
<td>10/10</td>
<td>Vertebral</td>
<td>100/0</td>
<td>12</td>
<td>All clinically asymptomatic</td>
</tr>
<tr>
<td>Werner24 (2010)</td>
<td>28/28</td>
<td>Vertebral</td>
<td>100/0</td>
<td>16</td>
<td>21.4% with restenosis &gt;50% on angiography</td>
</tr>
<tr>
<td>Abou-Chebl17 (2005)</td>
<td>4/4</td>
<td>IC internal carotid (2), MCA (1), basilar (1)</td>
<td>100/25</td>
<td>8.5</td>
<td>No restenosis on angiography and/or Doppler</td>
</tr>
<tr>
<td>Qureshi20 (2006)</td>
<td>4/4</td>
<td>IC internal carotid (2), MCA (1), basilar (1)</td>
<td>100/25</td>
<td>13.7</td>
<td>3/3 patent on angiography, 1 death at 7 mo</td>
</tr>
<tr>
<td>Steinfort22 (2007)</td>
<td>13/13</td>
<td>IC vertebral (8), basilar (5)</td>
<td>100/8</td>
<td>5.4</td>
<td>No significant restenosis in 9 subjects receiving angiography</td>
</tr>
</tbody>
</table>

CTA indicates computed tomography angiography; PES, paclitaxel-eluting stents; IC, intracranial; EC, extracranial; and MCA, middle cerebral artery.

Reported outcomes in 16 subjects receiving DES (11 with PES) for renal artery stenosis. Patency rates at 22 months were similar to those receiving a bare metal stent, though the arteries treated with DES were significantly smaller.30 Others have suggested that DES may be the preferred treatment for small, stenotic renal arteries because restenosis rates are significantly increased in these vessels.33 Two successful case reports involving PES to treat mesenteric in-stent restenosis have been reported.31,32

Infrapopliteal Disease

Primary patency rates for infrapopliteal intervention have been reported to be as low as 48% at 18 months for angioplasty34 and 17% at 3 years for bare metal stents after suboptimal angioplasty.35 The tibial vessels are comparable in size to the coronary arteries, naturally leading to interest in using DES for their treatment.

Siablis et al36 reported 29 patients with 50 infrapopliteal lesions treated with 62 PES. Though the technical success and limb salvage rates were 100% and 89%, respectively, 77% of treated lesions had significant angiographic in-stent restenosis and 30% of patients required repeat revascularization within 1 year. Renal disease and vessel occlusion were associated with worse outcomes.36

Grant et al37 reported 10 patients of whom 4 received PES to treat infrapopliteal arteries. At 1 year, the target revascularization rate was 10%. Three patients receiving follow-up angiography within 1 year were found to have patent stents. One stent thrombosis occurred 3 weeks after an initially successful procedure. Details regarding outcomes based on the DES type were not reported.37 McMillan et al38 reported outcomes of 52 tibial vessels treated with PES. Limb salvage was 86% at 26 months; primary patency was 73% at 24 months.
PARADISE was a prospective cohort of 106 patients treated with infrapopliteal DES for critical limb ischemia. PES were used in 17% of cases. Amputation and survival rates at 3 years were 6% and 71%, respectively. Notably, restenosis rates were found to be lower with sirolimus-eluting stents compared with PES. A recent meta-analysis also suggested better outcomes when using sirolimus-eluting stents for infrapopliteal disease.

The PICOLLO and PADI trials are ongoing, randomized trials investigating the use of paclitaxel-coated balloons (PCB) and PES to treat infrageniculate disease in subjects with critical limb ischemia. Their results should help clarify the role of paclitaxel in tibial vessels, but it should be noted that, based on available evidence, sirolimus may be more efficacious in this distribution when using sirolimus-eluting stents for infrapopliteal disease.

**Femoropopliteal Disease**

The THUNDER trial randomly assigned 154 subjects with symptomatic femoropopliteal disease to 1 of 3 treatment strategies: angioplasty (control), angioplasty with PCB, or angioplasty in presence of paclitaxel-containing contrast medium (Table 3). Mean lesion length was 7.4 cm, 27% were occlusions, and 36% had been treated previously. At 6 months, angiographic late lumen loss was significantly lower in the PCB group (0.4 mm versus 1.7 mm, \(P<0.001\)). Target lesion revascularization was significantly lower in the PCB group at 6 and 24 months (4% versus 29% at 6 months, \(P<0.001\); 15% versus 52% at 24 months, \(P<0.001\)). No benefit was seen in the paclitaxel-contrast group.

The Femoral Paclitaxel (FemPac) trial randomly assigned 87 patients with femoropopliteal disease to angioplasty or angioplasty using a PCB. Mean lesion length was 6.6 cm, and 16% were occlusions. At 6 months, late lumen loss was 0.5 mm in the PCB group compared with 1.0 mm in the control group (\(P=0.031\)). Target lesion revascularization occurred in 7% and 33% of the PCB and control groups, respectively (\(P=0.045\)). This difference was maintained at 18 months.

Dake et al recently reported their 12-month findings from the ZILVER PTX trial, a 479-patient, randomized study comparing a polymer-free PES with angioplasty and bare metal stent for superficial femoral artery disease. Mean lesion length was 6.5 cm. Twenty-seven percent of treated lesions were occlusions; only 5% had been previously treated. Primary patency at 12 months was achieved in 83% of subjects receiving the PES versus 67% of those receiving angioplasty with provisional stenting (\(P<0.01\)). In a subgroup undergoing secondary randomization after suboptimal angioplasty, patients receiving the PES had significantly less restenosis than those receiving the same stent without the paclitaxel coating (90% versus 73%, \(P<0.05\)). The stent fracture rate was 0.9%. No adverse events attributable to paclitaxel were reported in the THUNDER, FemPac, or ZILVER PTX trials.

Latif and Hennebry reported the successful treatment of 1 iliac and 1 superficial femoral artery with paclitaxel delivered in saline using a microporous, irrigating catheter (Clearway Catheter, Atrium Medical Corp, Hudson, NH). Both patients remained asymptomatic during a brief follow-up duration of 4 months. An investigator-initiated pilot study evaluating safety and efficacy of this delivery method is now ongoing (IRRITAX, NCT 00821028). This trial is randomly assigning patients with TASC II A-C femoropopliteal lesions to standard therapy versus standard therapy with paclitaxel irrigation. The primary end point is restenosis at 12 months on ultrasonography.

### Comparisons of Local Delivery Methods

No comparative data exist regarding the optimal drug delivery method for paclitaxel in the peripheral vasculature. Three methods of delivery for femoropopliteal disease have been reported. Table 4 summarizes the key distinctions between these methods.

**Coronary PES use polymers for drug binding that alter drug release kinetics to provide a sustained drug release over days to weeks. This is in contrast to bolus delivery methods such as irrigation or DCB, in which the paclitaxel is administered in higher doses during short exposure times. Either method results in prolonged retention of drug in the vessel wall, but it is unclear if vessel healing differs between these different mechanisms of delivery, especially in the presence of an indwelling stent.**

As the result of stent structure and cell design, the highest tissue concentrations of antiproliferative drug are located at the strut sites. This nonuniform drug distribution may be an important limitation in larger vessels, particularly when the distance between struts increases. Both irrigation and DCB theoretically allow for a more uniform exposure of drug to the targeted vessel wall. Conversely, total drug dosing may be

---

Table 3. Trials of Local Paclitaxel Delivery for Femoropopliteal Disease

<table>
<thead>
<tr>
<th>Trial</th>
<th>Mechanism of Delivery</th>
<th>Dose</th>
<th>Patients Enrolled, n</th>
<th>Lesion Length (Mean, cm)</th>
<th>Follow-Up Duration</th>
<th>Results</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>THUNDER</td>
<td>PCB (2)</td>
<td>3 (\mu g/mm^2)</td>
<td>154</td>
<td>7.4</td>
<td>24 mo</td>
<td>LLL at 6 mo, 0.4 mm vs 1.7 mm (P&lt;0.01), favoring PCB</td>
<td>Revascularization rates lower with PCB at 24 mo (15% vs 52%), no benefit with paclitaxel-containing contrast</td>
</tr>
<tr>
<td>FemPac</td>
<td>PCB</td>
<td>3 (\mu g/mm^2)</td>
<td>87</td>
<td>6.0</td>
<td>24 mo</td>
<td>LLL at 6 mo, 0.5 cm vs 1.1 cm, favoring PCB</td>
<td>Revascularization rates lower with PCB at 24 mo (13% vs 50%)</td>
</tr>
<tr>
<td>ZILVER PTX</td>
<td>PES</td>
<td>3 (\mu g/mm^2)</td>
<td>479</td>
<td>6.5</td>
<td>12 mo</td>
<td>Primary patency, 83% vs 67%, favoring PES</td>
<td>Stent fracture rate 0.9%</td>
</tr>
</tbody>
</table>

LLL indicates late lumen loss; PCB, paclitaxel-coated balloons; PES, paclitaxel-eluting stents.
more precise with DES because significant amounts of drug may be lost downstream with DCB and irrigation methods.

Paclitaxel irrigation occurs during low pressure balloon inflation and after the lesion has received standard angioplasty.43 Other methods use high-pressure inflations for delivery.4 Tissue uptake and vascular response to drug exposure may differ after injury from high-pressure inflations. Similarly, other procedures such as atherectomy may influence tissue responses to local drug delivery.

Differences in DES efficacy and safety have become apparent with the development of new antiproliferative agents and polymers.1 It follows that not all DCB are similarly efficacious. In an animal model of restenosis, the Paccocath PCB recently outperformed the Dior PCB, suggesting that efficacy may differ even among polymer-free PCB.46 Similarly, paclitaxel exhibits much higher solubility in iodinated media than in saline. The currently described methods of paclitaxel irrigation in humans have used saline,43 as did the pioneering work by Axel et al12 in animal models of restenosis. It is unknown at this time what effects alternative irrigation methods might have, though it is noteworthy that the paclitaxel-contrast arm of the THUNDER trial demonstrated no benefit.4

### Future Directions

The recent benefits reported with local paclitaxel delivery in femoropopliteal disease are welcome advances, though progress is needed in understanding how to deliver patient-centered, lesion-specific therapy. Optimal application of local drug delivery for PAD probably will hinge on a host of variables including patient characteristics, lesion characteristics, and vascular bed involved (Figure).

Evidence to date favors paclitaxel for femoropopliteal disease, though no trials comparing paclitaxel with sirolimus have been conducted, and only sirolimus on a DES platform has been tested in this distribution.4,5,47 In contrast, sirolimus-eluting-stents may be more efficacious than PES in the infrapopliteal distribution.35,36,40 The utility of newer antiproliferatives, such as the sirolimus analogs, remains to be determined.48

Patient and lesion characteristics are important considerations as well. Though no consensus exists regarding dual antiplatelet therapy after peripheral intervention, patients not suitable for prolonged dual antiplatelets may be poor candidates for DES. Similarly, stentless drug delivery may be desirable in locations vulnerable to compression, lesions involving in-stent restenosis, and with interventions jeopardizing vessel integrity.

### Table 4. Comparisons of Methods for Local Drug Delivery

<table>
<thead>
<tr>
<th>Drug delivery</th>
<th>Drug-Coated Balloons</th>
<th>Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue distribution</td>
<td>Low dose, prolonged exposure</td>
<td>High dose, brief exposure</td>
</tr>
<tr>
<td>Mechanism of delivery</td>
<td>Highest near stent struts</td>
<td>Theoretically uniform</td>
</tr>
<tr>
<td>Advantages</td>
<td>High pressure, either before or after predilation</td>
<td>High pressure, no predilation</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>Limits recoil, treats vessel dissection</td>
<td>Stentless delivery avoids nidus for restenosis, drug can be delivered in segments where stent is undesirable</td>
</tr>
</tbody>
</table>

### Figure
Figure. Considerations for optimizing local drug delivery.
dizing major side branches. There is emerging evidence that antiproliferative drug uptake is influenced by the degree of vascular disease present. Not only does the degree of disease influence how a single drug is absorbed, these differences are not uniform and differ between antiproliferatives. How plaque morphology influences drug uptake and how these differences affect drug efficacy remains to be determined. As such, one can portend the need for better "lesion stratification," either with advanced imaging modalities or with molecular techniques to identify the ideal antiproliferative for a specific lesion.

Conclusions

The antirestenotic properties of paclitaxel continue to make this agent important in the treatment of peripheral vascular disease. Multiple methods of local paclitaxel delivery are available, and more probably will become available in the near future. Rather than competitors, these methods may be complementary. The ideal application of this technology will be based on a complex number of factors that need clarification with future research. It is unclear if alternative antiproliferatives will replace paclitaxel, but it is certain that future advances in this field of local drug delivery will have been aided by the knowledge gained with its use in the peripheral vasculature.

Disclosures

Dr Henneby is the principal investigator of IRRITAX. Atrium Medical Corporation is supplying irrigating catheters and a grant to cover paclitaxel costs. Atrium has no role in trial design or any aspect of the project. Hawkins and Henneby Paclitaxel and PAD

References


Local Paclitaxel Delivery for Treatment of Peripheral Arterial Disease
Beau M. Hawkins and Thomas A. Hennebry

_Circ Cardiovasc Interv_. 2011;4:297-302; originally published online May 3, 2011;
doi: 10.1161/CIRCINTERVENTIONS.110.961052

_Circulation: Cardiovascular Interventions_ is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2011 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-7640. Online ISSN: 1941-7632

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circinterventions.ahajournals.org/content/4/3/297

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in _Circulation: Cardiovascular Interventions_ can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to _Circulation: Cardiovascular Interventions_ is online at:
http://circinterventions.ahajournals.org//subscriptions/