

4. Balgrist Symposium zum Diabetischen Fuss

Der Charcot-Fuss

Angiologische Aspekte

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UniversitätsSpital
Zürich



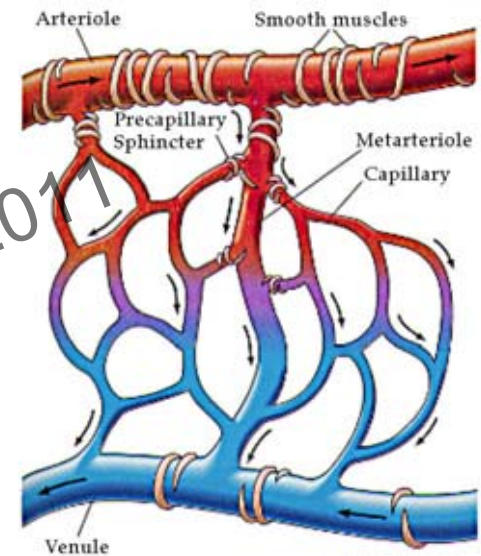
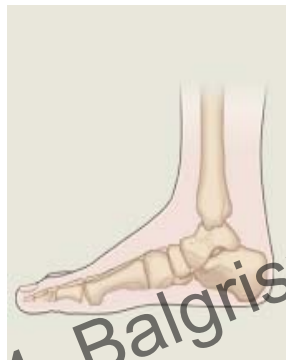
Universität Zürich

Charcot-Fuss und Angiologie

Neuropathie

Makroangiopathie

Mikroangiopathie



Sherrill, Lauralee
Human Physiology, 2nd
West Publishing

4. Balgrist Symposium zum Diabetischen Fuss

Der Charcot-Fuss
27. – 28. Oktober 2011

Peripher arterielle Verschlusskrankheit

```
graph TD; A[Peripher arterielle Verschlusskrankheit] --> B[Asymptomatisch/  
Claudicatio  
intermittens]; A --> C[Diabetisches  
Fusssyndrom]; A --> D[Chronisch  
kritische Ischämie]; A --> E[Akute  
kritische Ischämie];
```

The diagram is a hierarchical flowchart. At the top is a light blue rounded rectangle containing the title 'Peripher arterielle Verschlusskrankheit'. A vertical line descends from the center of this box to a horizontal line. From this horizontal line, four vertical lines lead down to four separate rounded rectangles. The second rectangle from the left is highlighted in red and contains the text 'Diabetisches Fusssyndrom'. The other three rectangles are light blue and contain 'Asymptomatisch/ Claudicatio intermittens', 'Chronisch kritische Ischämie', and 'Akute kritische Ischämie' respectively. A large, semi-transparent watermark is overlaid diagonally across the center of the image, reading '4. Belgist Symposium zum Diabetischen Fuss' and 'Der Charcot-Fuss' with the dates '27. - 28. Oktober 2011'.

**Asymptomatisch/
Claudicatio
intermittens**

**Diabetisches
Fusssyndrom**

**Chronisch
kritische Ischämie**

**Akute
kritische Ischämie**

Diabetes mellitus und Gefäße

Systemisch

- kardiovaskuläre Morbidität/Mortalität



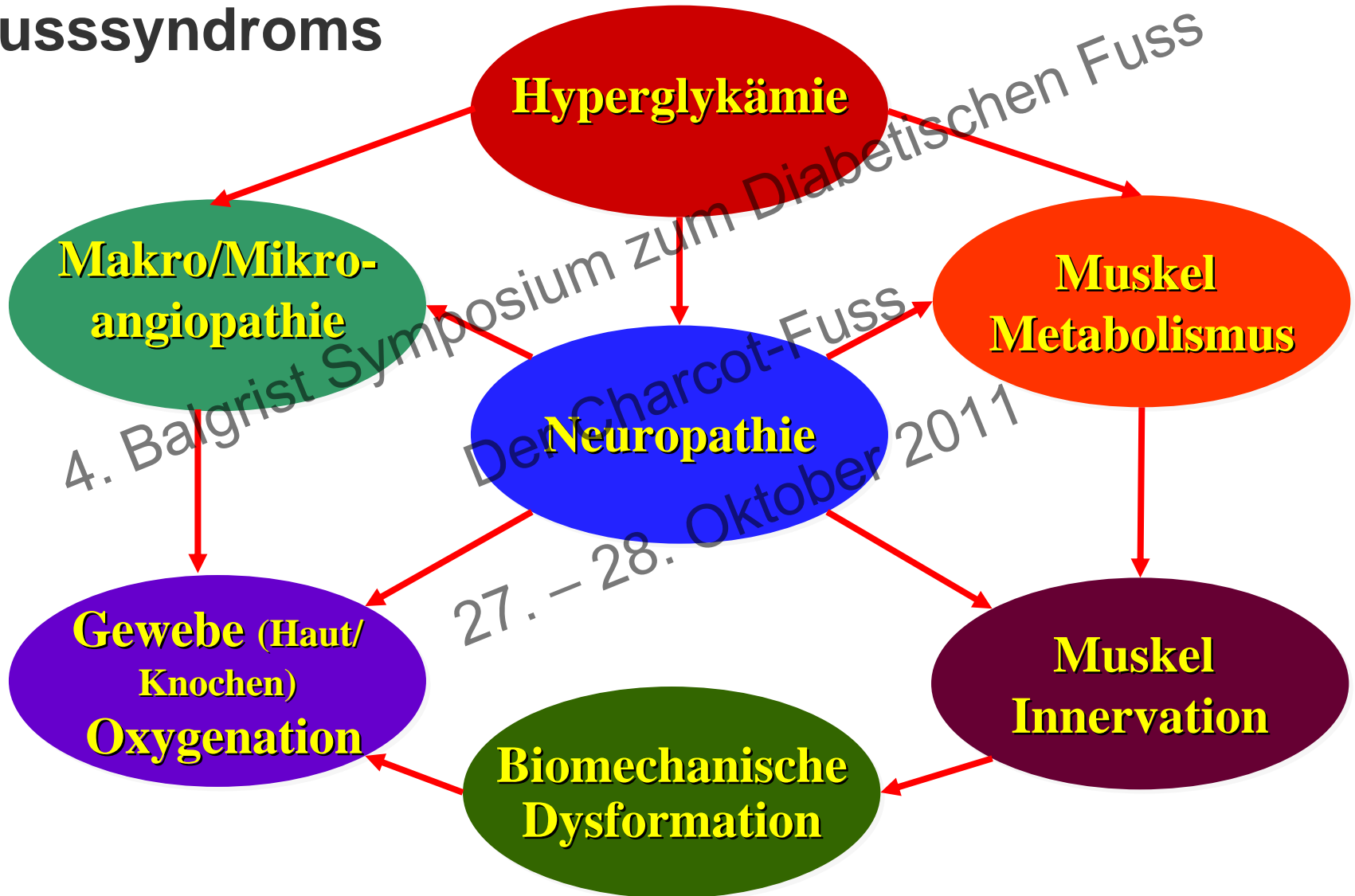
4. Balgrist Symposium zum Diabetischen Fuss

Der Charcot-Fuss

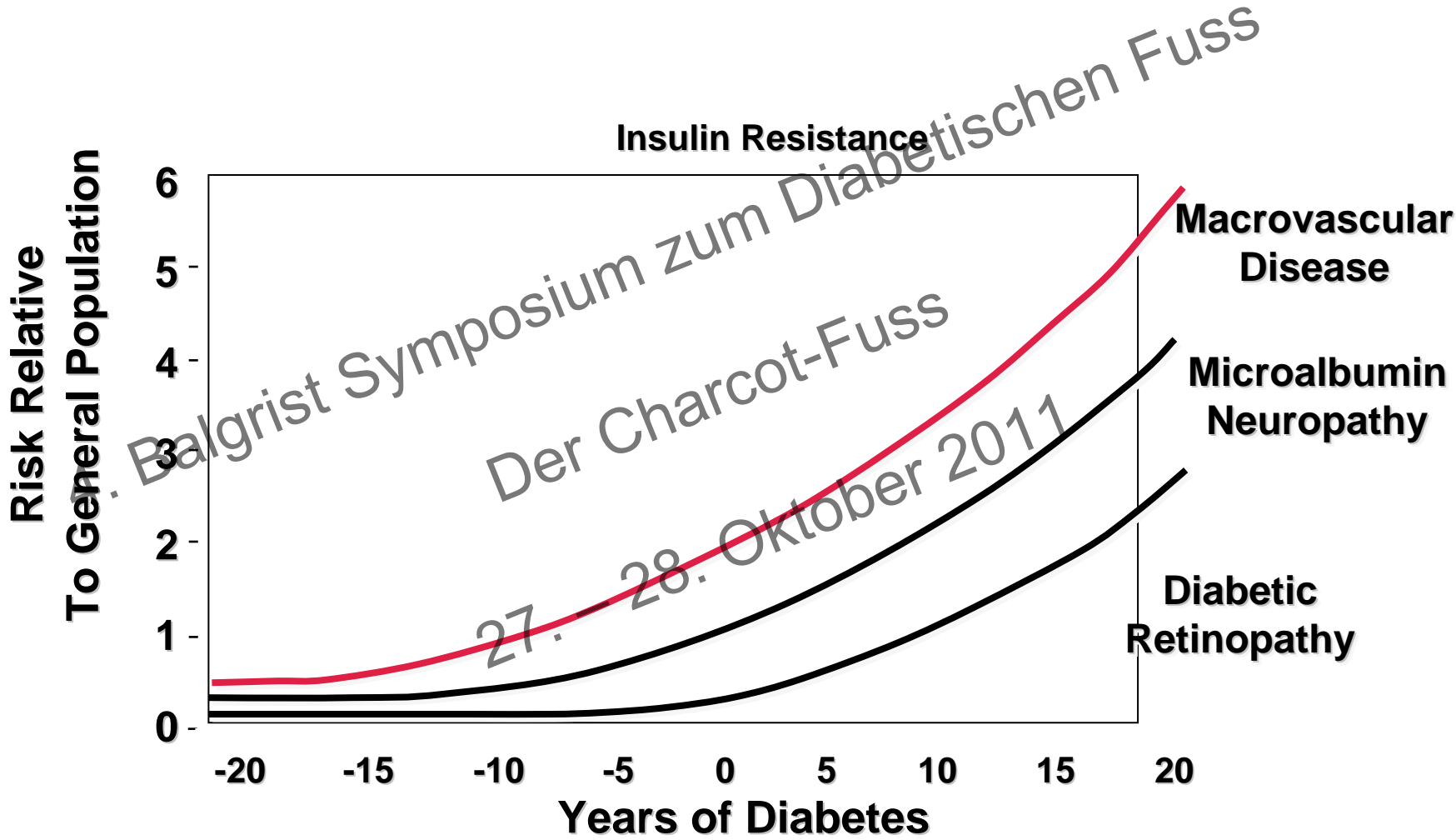
27. – 28. Oktober 2011

PAVK und Diabetes: **LOKAL**

Pathophysiologie des diabetischen Fussyndroms



Komplikationen Diabetes mellitus/ Metabolisches Syndrom

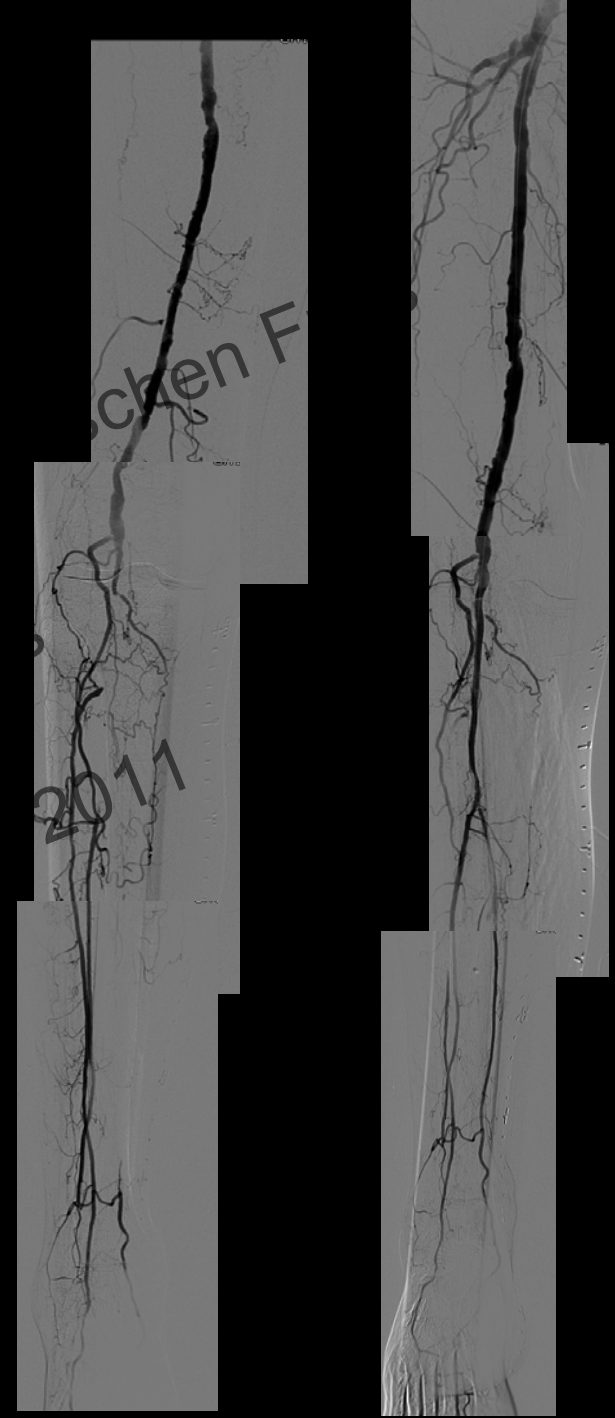
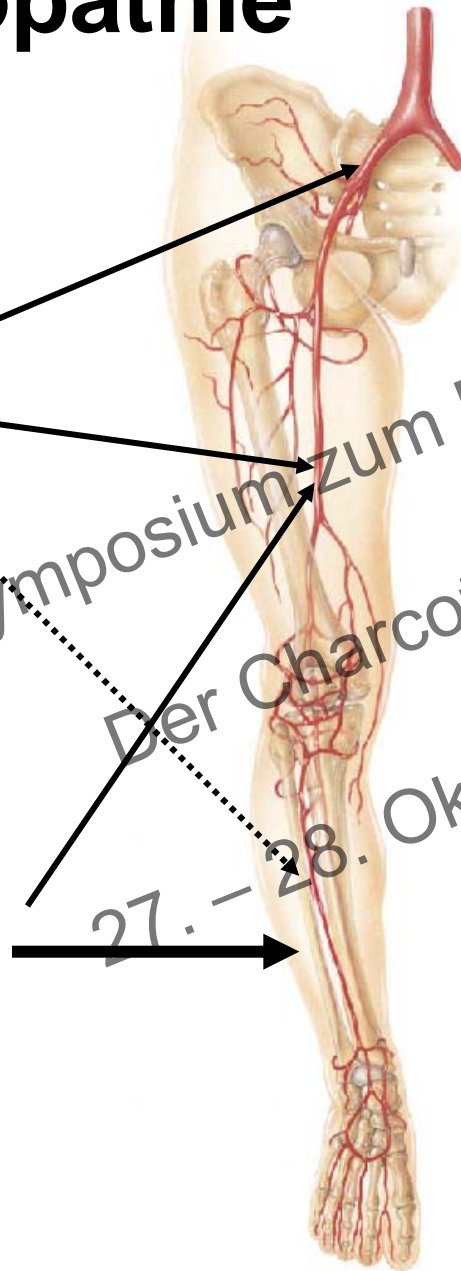


Adapted from: Kendall DM. Am J Manag Care 7S327-S343, 2001.

Makroangiopathie

Rauchen
Cholesterin
Hypertonie

Diabetes mellitus
Steriode
Niereninsuffizienz
Alter

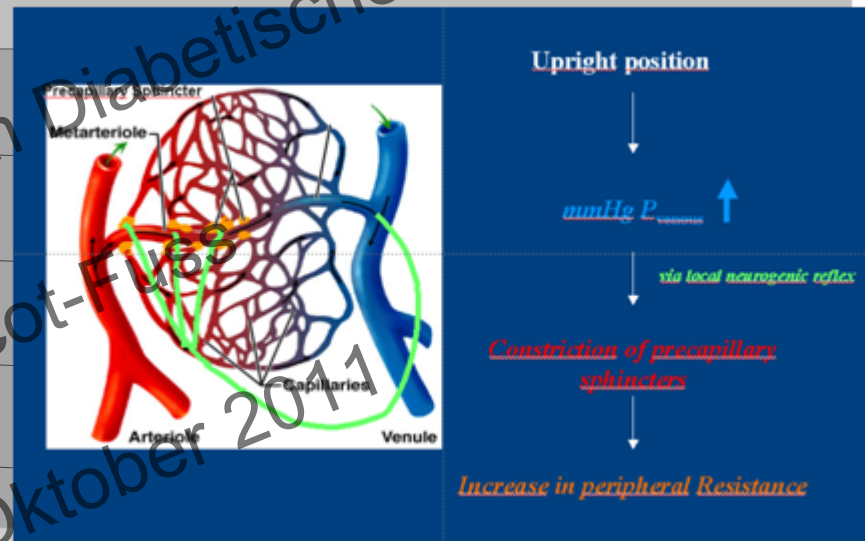
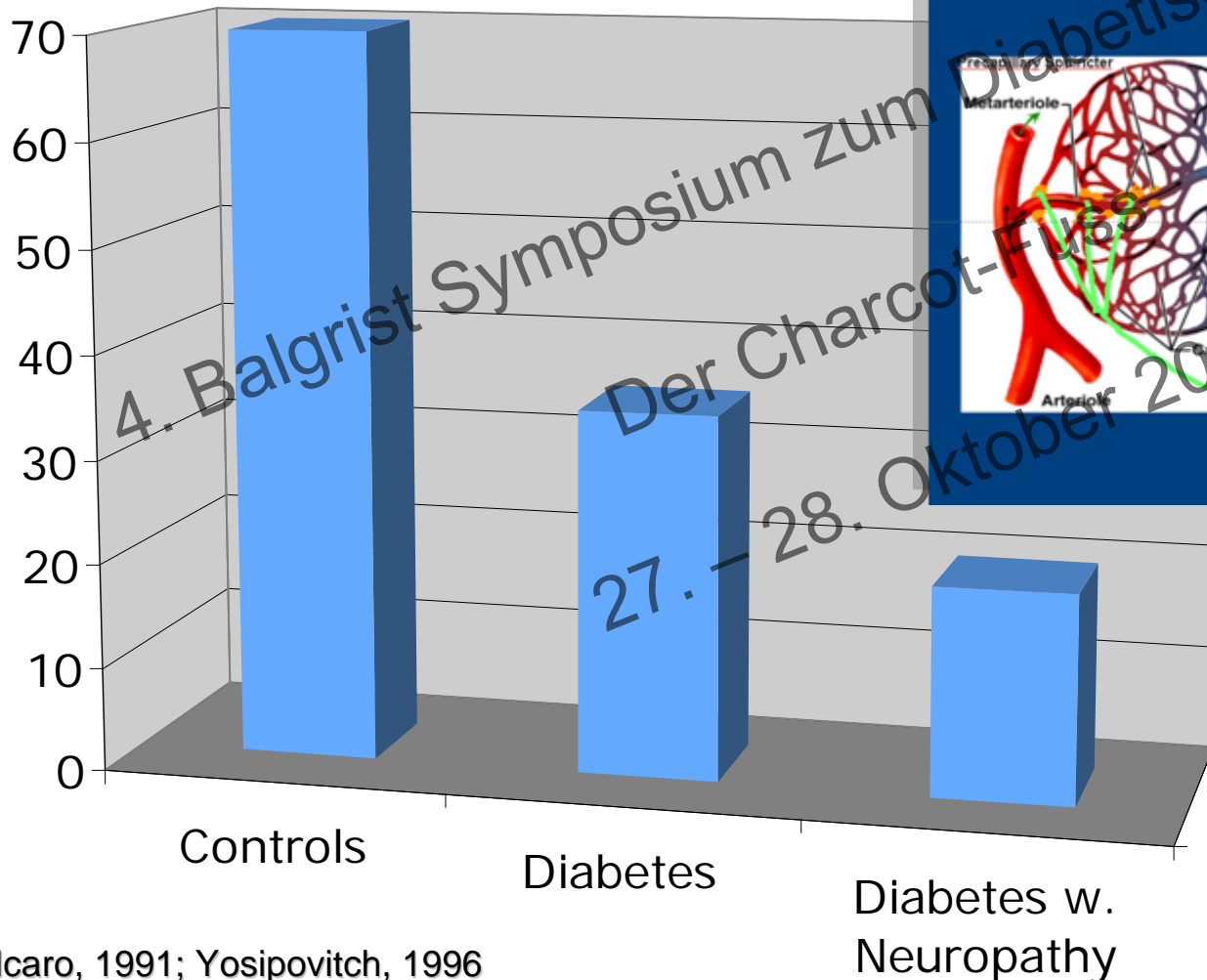


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Der Charcot-Fu
27. - 28. Oktob

2011

Mikroangiopathie: funktionell

Störung der Vasoregulation

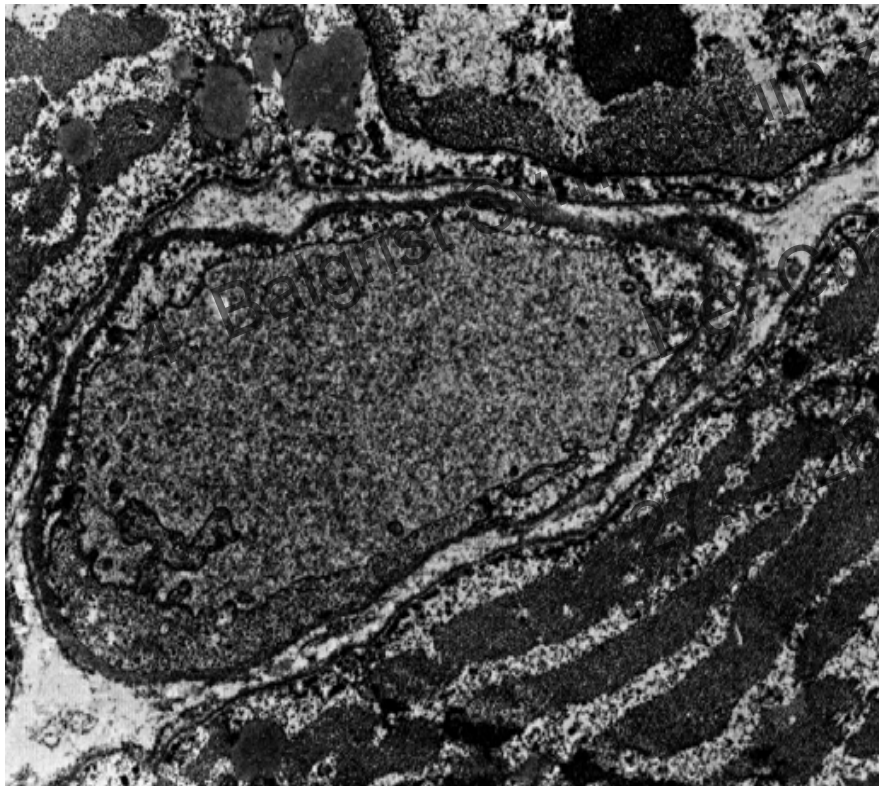


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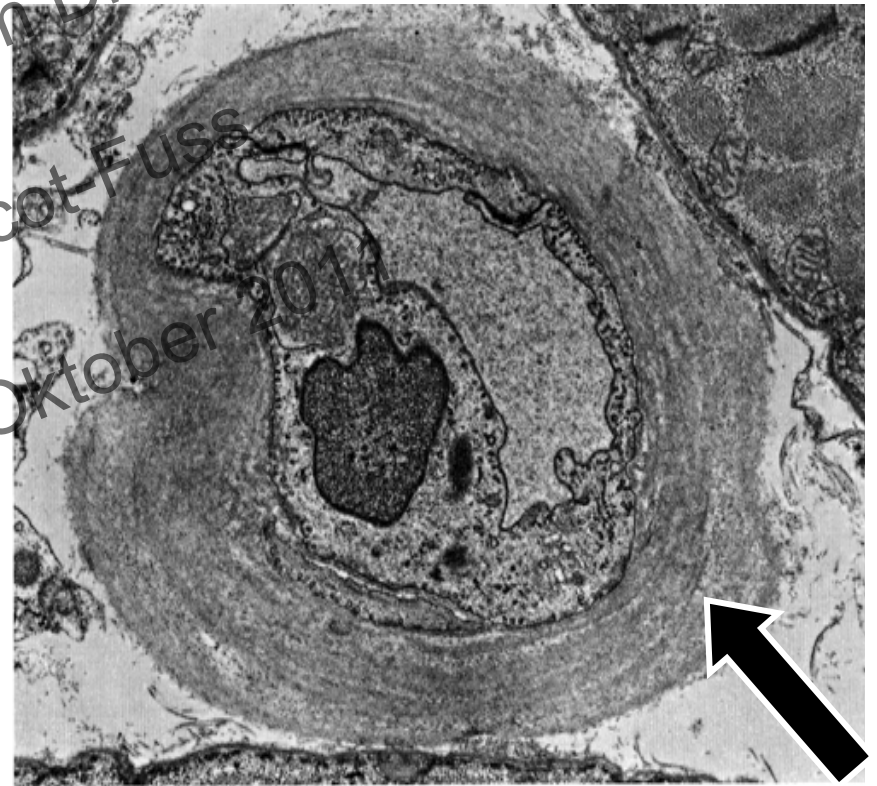
Mikroangiopathie: **strukturell**

Verdickung der Basal Lamina

Cross section capillary abdomen



Cross section capillary foot



Klinische Stadieneinteilung der PAVK

Stadieneinteilung nach Fontaine

I: asymptomatisch

II: Claudicatio intermittens

a: mässige Beeinträchtigung, Auftreten der Beschwerden nach >200 m Gehstrecke

b: schwere Beeinträchtigung, Auftreten der Beschwerden nach <200 m Gehstrecke

III: „Ruheschmerzen“

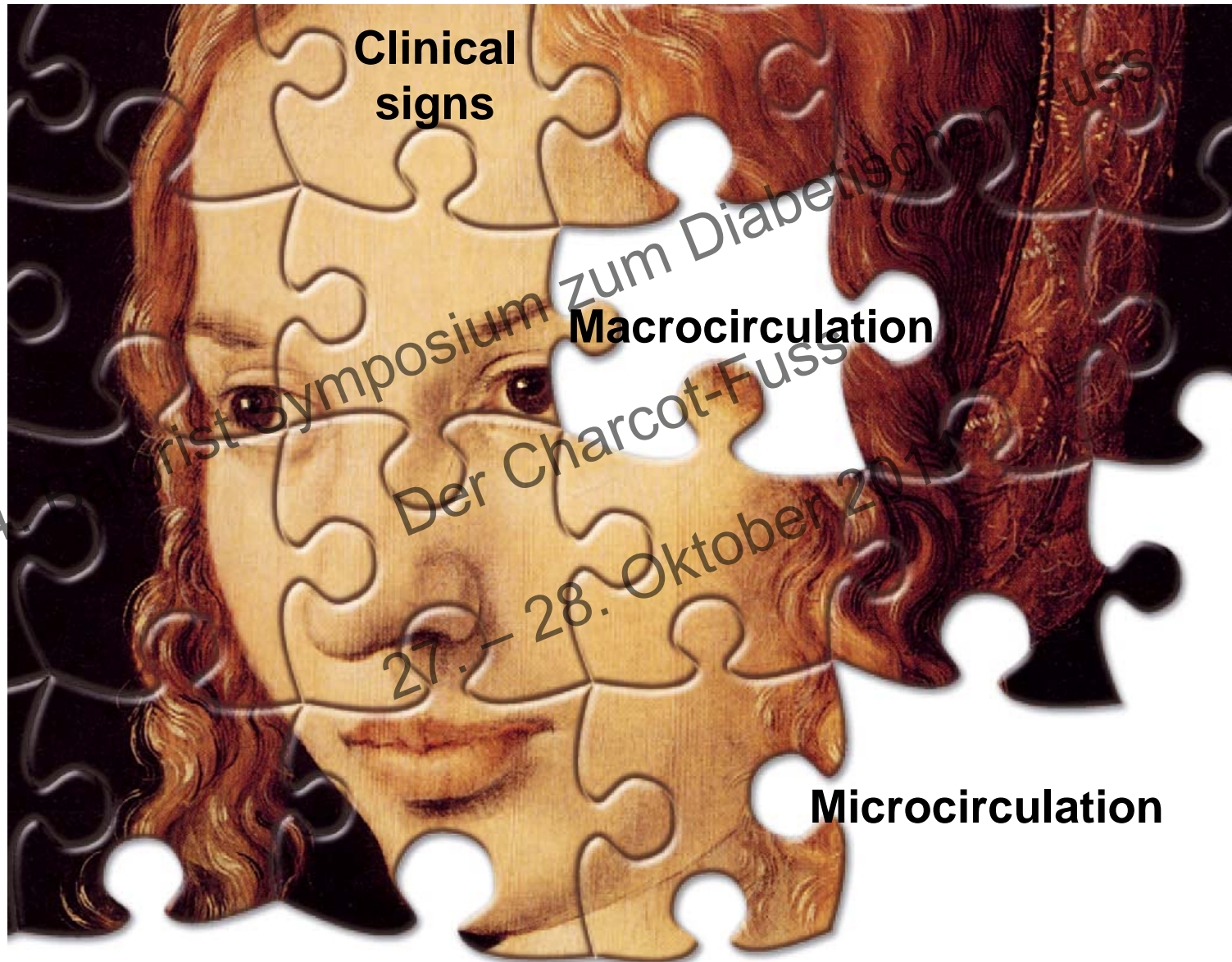
IV: „Ruheschmerzen“ und ischämie-bedingte trophische Läsionen

**Trophische
Läsionen**



4. Baugrist Symposium zum Diabetischen Fuss
Der Chalfont-Fuss
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Beurteilung der Perfusion/Zirkulation



**Clinical
signs**

Macrocirculation

Microcirculation

4.

Christ Symposium zum Diabetischen Fuß
Der Charcot-Fuß
27. - 28. Oktober 2011

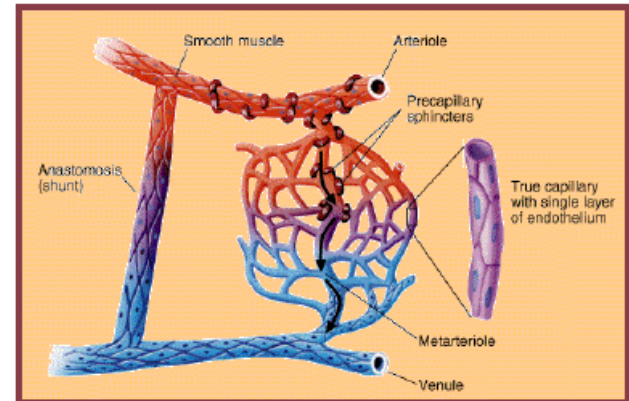
Nicht-invasive Untersuchungen Makro- und Mikrozirkulation

Arterial (Macrovascular)

- Ankle-Brachial Index (ABI)
- Pulse Volume Recording (PVR)
- Segmental Pressures
- Toe-Brachial Index (TBI), aka toe pressure

Distal Arterial (Microvascular)

- Transcutaneous Oxygen Monitoring (TCOM/TcPO₂)
- Skin Perfusion Pressure (SPP)



4. Balgust Symposium zum Diabetischen Fuss
Der Charcot-Fuss
21.-28. Oktober 2011

Diagnostik Makrozirkulation

**Knöchelarterien-
Druck (mmHg)**



**Digitalarterien-
Druck (mmHg)**



Mediocalcinosis

Ödem

Wunden

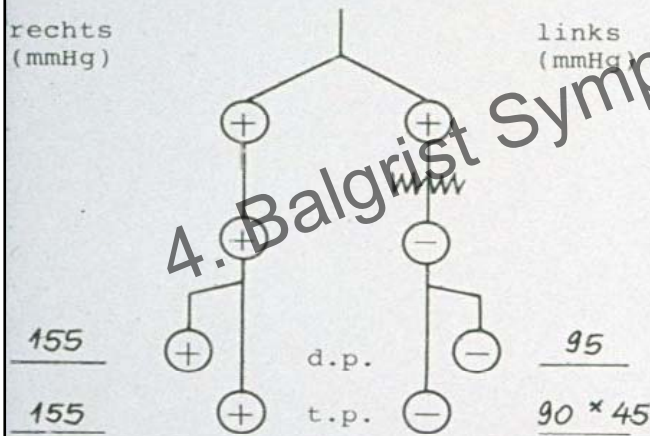
Angiologische Untersuchungen

Pulsstatus/Auskultation und ABI

Pulsschema

rechts
(mmHg)

links
(mmHg)



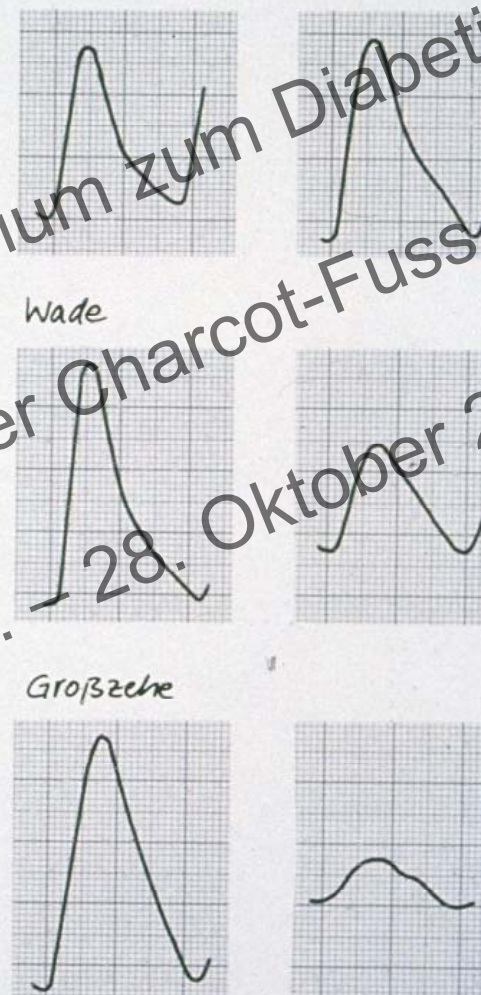
Ruhe:

OA-BD $\frac{145/90}{-5 (1,03)}$ $\frac{150/90}{+55 (0,63)}$

ΔP (ASPI)

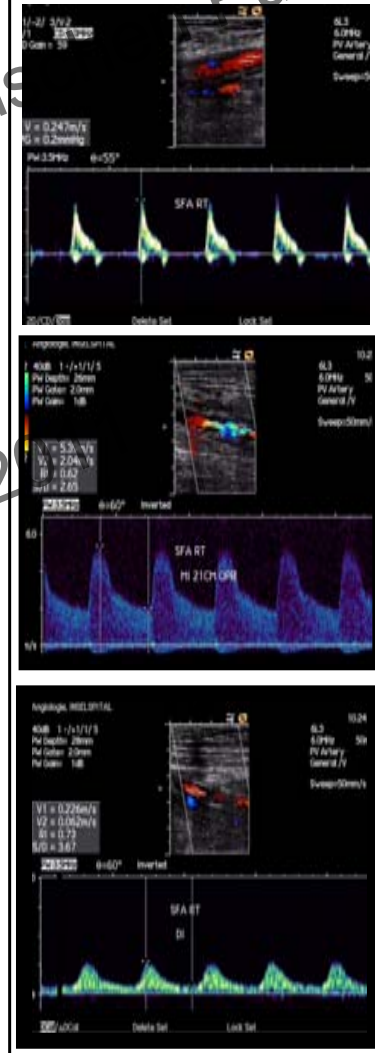
Knöchel-Arm-Index

Pulsvolumenkurven



Duplex

EUSS



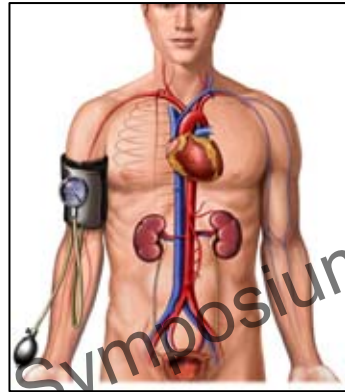
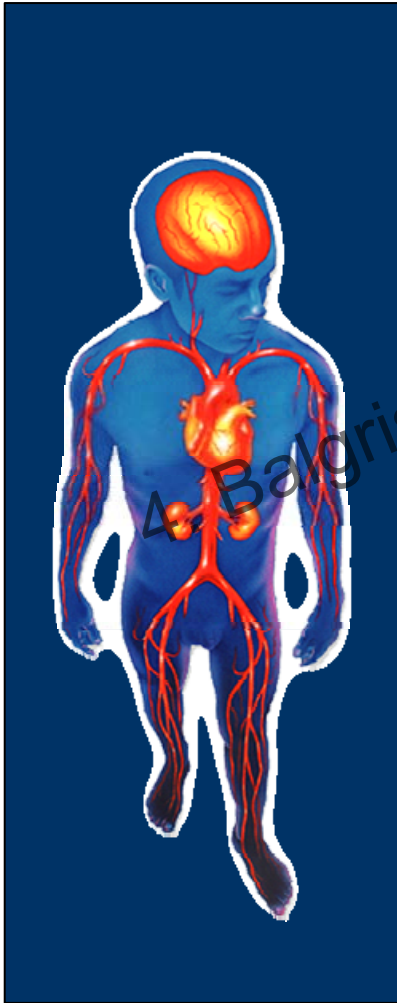
MRI



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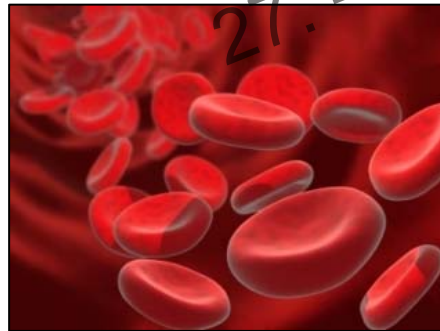
Diagnostik Mikrozirkulation

Macrocirculation



Arterial pressure

Blood Flow



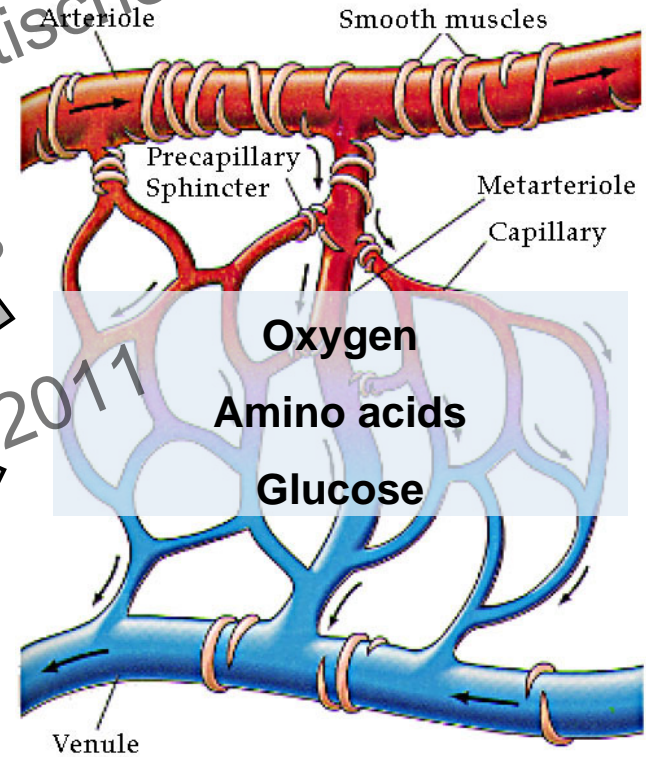
SPP



O₂

tcPO₂

Microcirculation



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Transkutane Sauerstoffspannung



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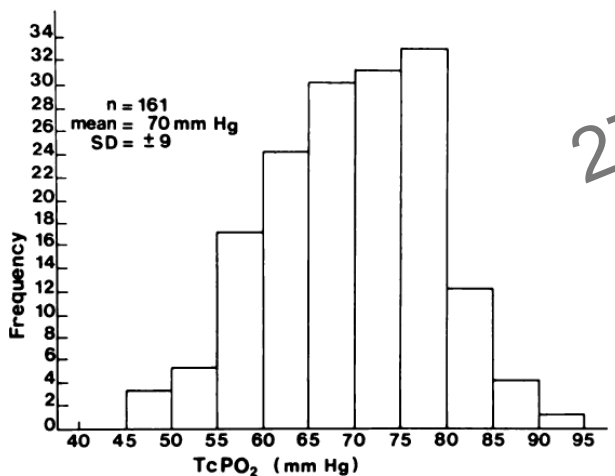
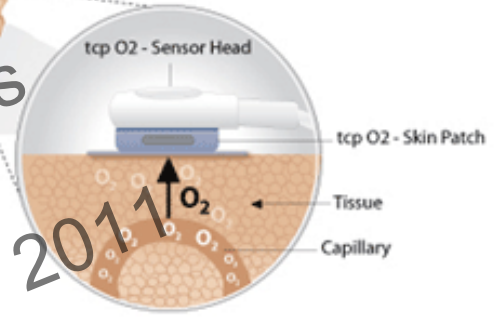
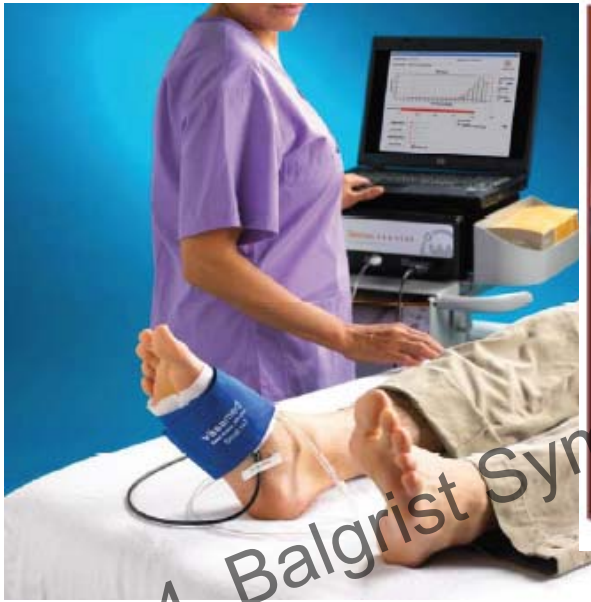


Fig. 2

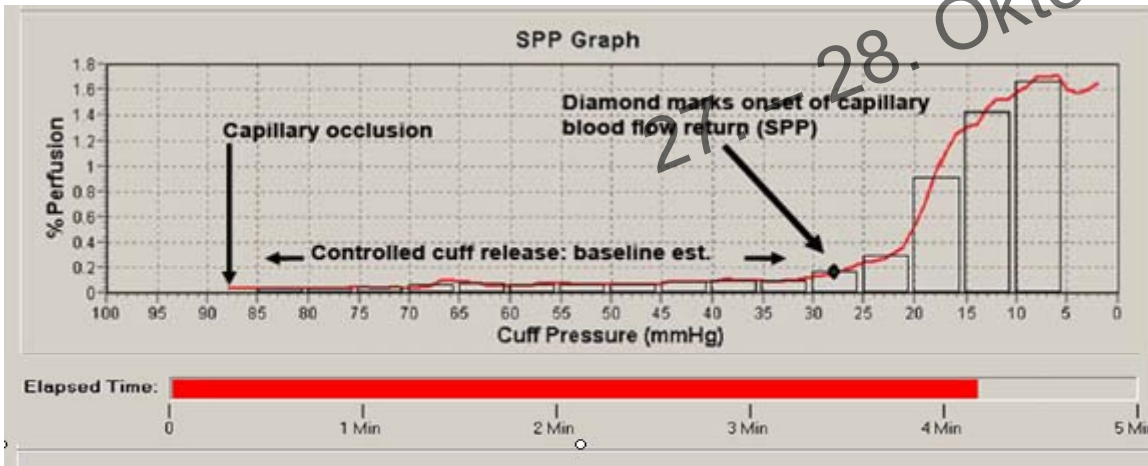
Histogram of the tcPO₂ recorded in the legs of 161 normal volunteers.

	tcPO ₂ (mmHg)
Normal	>60
Mild	40-50
Mild-severe	20-40
Severe	<20

Haut-Perfusionsdruck skin perfusion pressure (SPP)



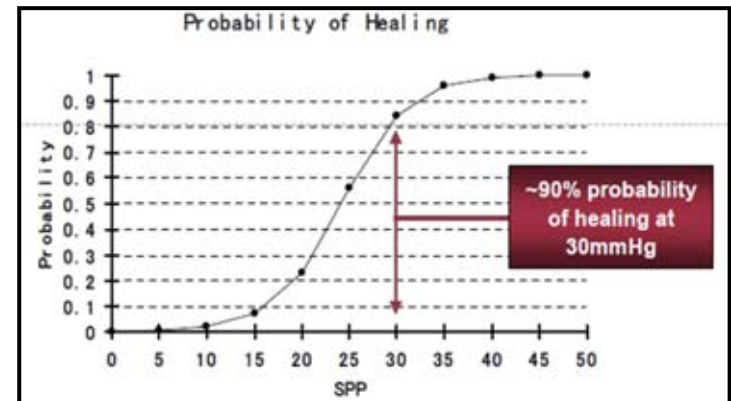
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Skin perfusion pressure

$$\text{SPP} = \text{MAP} - 20\text{mmHg}$$

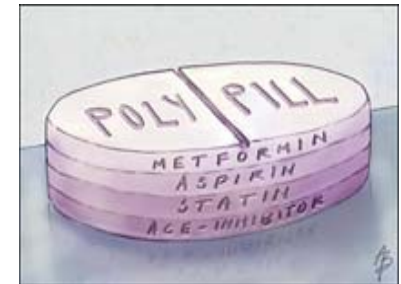
Normal SPP	$\geq 50\text{mmHg}$	Sufficient perfusion for healing
Mild Ischemia	40 - 50mmHg	Consider conservative treatment – Monitor patient closely; vascular referral recommended
Ischemia	30 - 40mmHg	Cautionary zone – Monitor patient closely; vascular referral recommended
Severe Ischemia (CLI)	$\leq 30\text{mmHg}$	Wound healing unlikely – Immediate vascular referral recommended



Medikamentöse Therapie bei PAVK und Diabetes mellitus

Effekt auf Mortalität

Drug treatment		^a Hazard ratio (95% confidence interval)
Statins	zB Crestor 10-20mg)	0.46 (0.36–0.58)
Beta-blockers		0.68 (0.58–0.80)
Anti-platelets	Aspirin/Plavix)	0.72 (0.61–0.84)
ACE inhibitors	zB Coversum 4mg	0.80 (0.69–0.94)



Antiaggregation als Basis

PAVK I-II

- ASS 100 mg

PAVK III-IV

- Unbefristet Clopidogrel

Therapie der Makroangiopathie

> Endovaskulär

- PTA, Stenting
- Atherektomie

> Chirurgisch

- Atherektomie, Bypass

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76-jähriger Mann

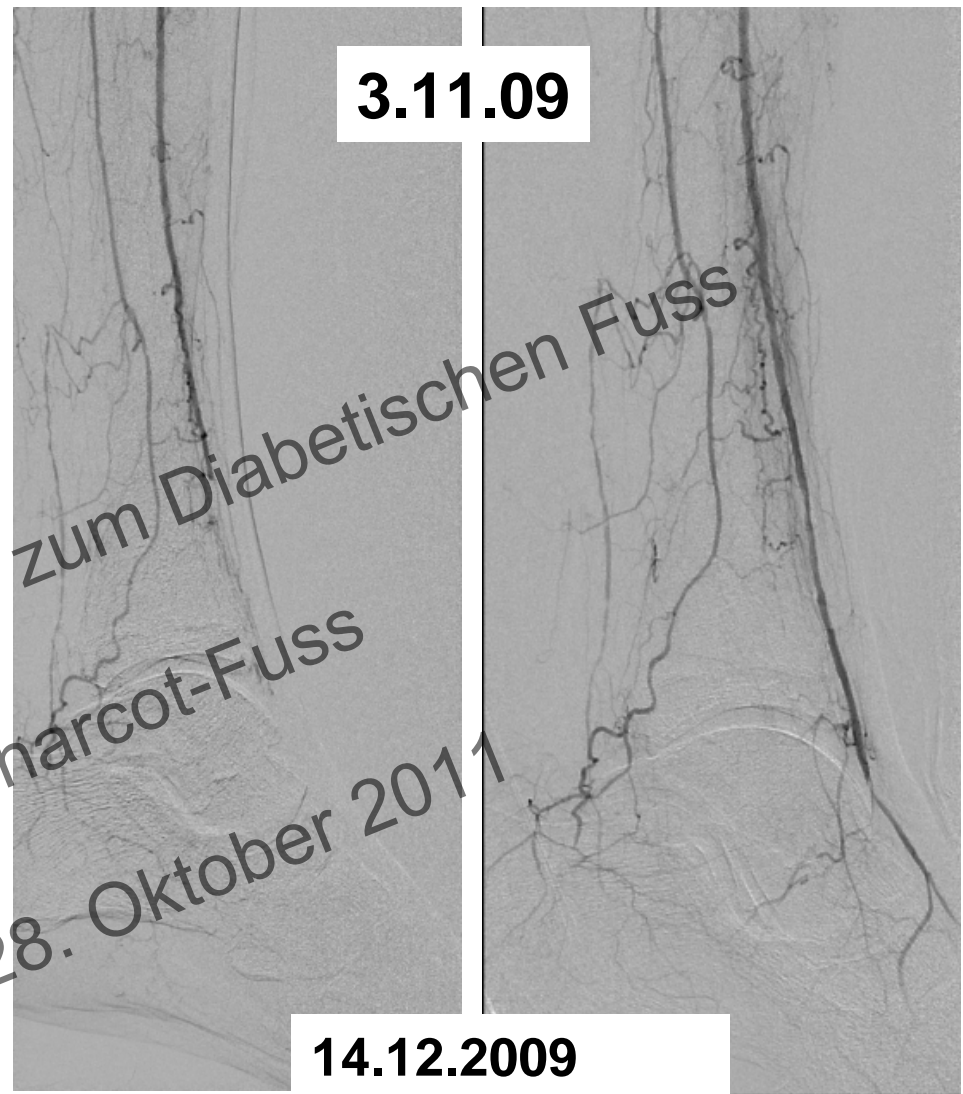
> PAVK Stadium I-II
kompliziert

> Risikofaktoren:

- Rauchen
- Diabetes mellitus
- Dyslipidämia
- Art. Hypertonie

> cv Comorb:

- CAD (PCI/Stenting RCA 4/07)

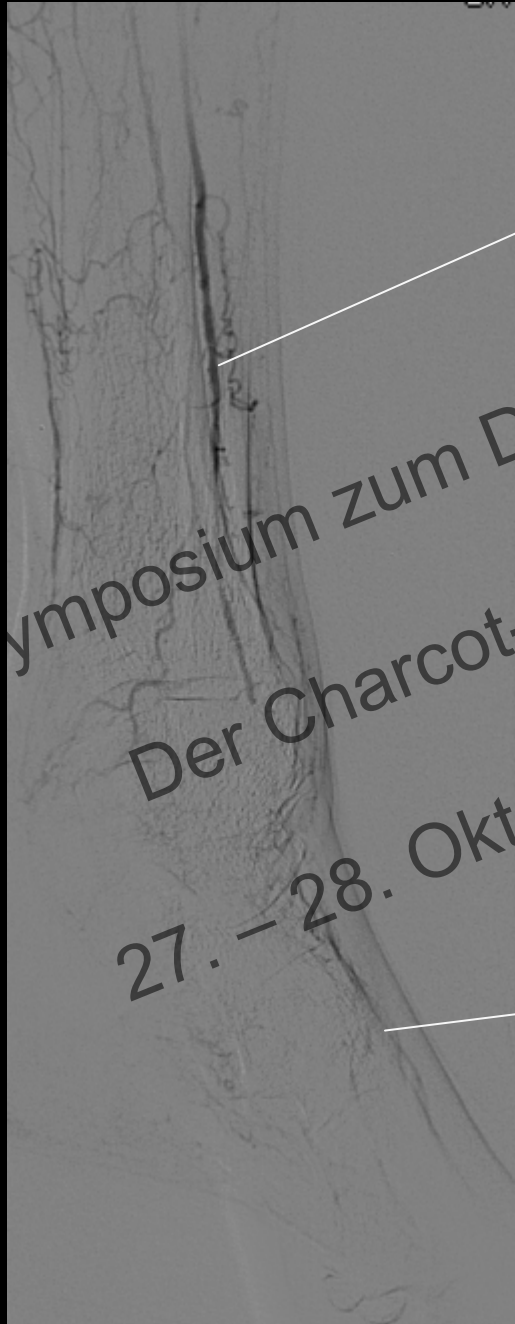


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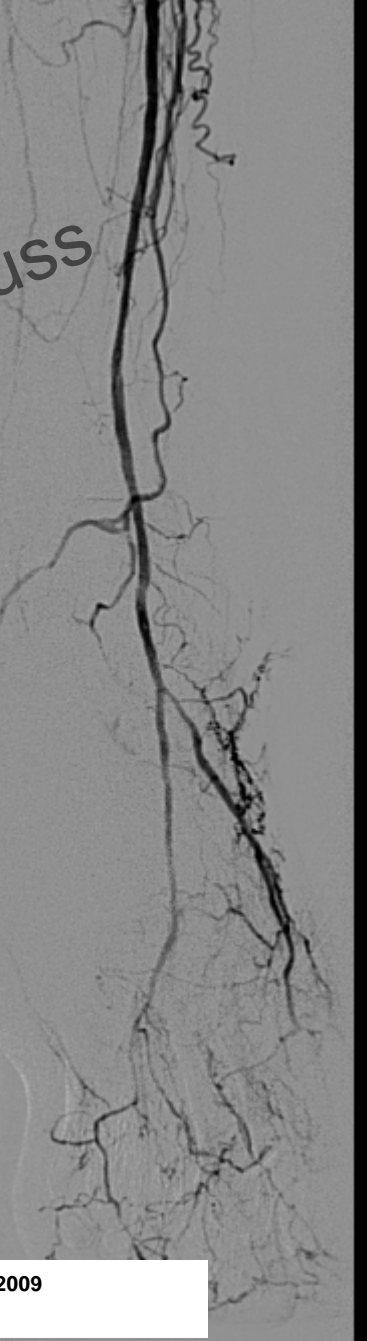
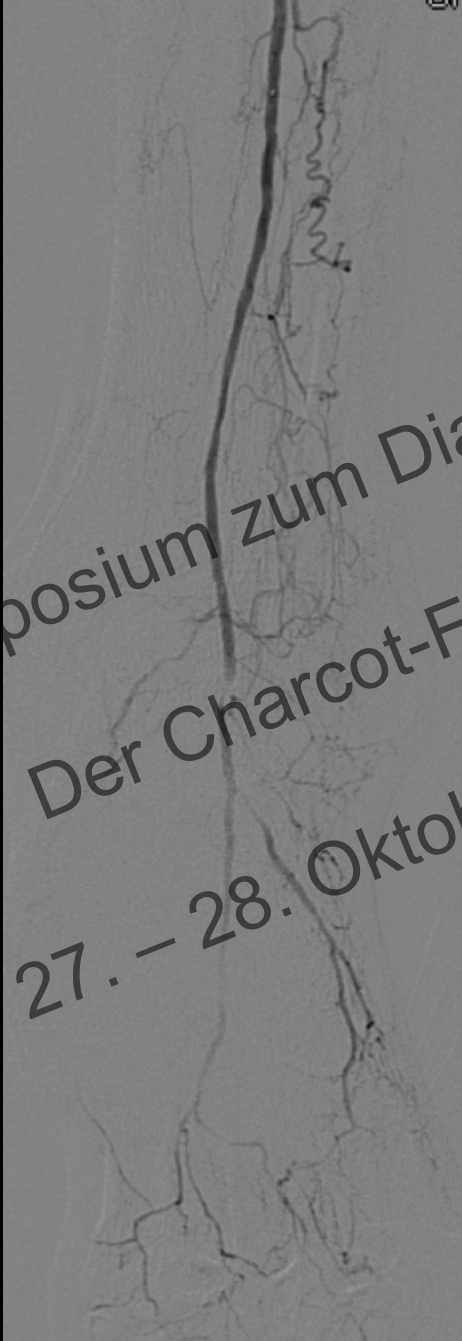
14.12.2009

Druckwerte

	rechts	links (mm Hg)
Oberarm (RR)		170/80
A. dors.pedis	>200	>200
A. tib.post.	180	>200
A. fibularis	>200	>200
ABI	>1,3	>1,3
Grosszehendruck	rechts 50mmHg,	links 10mmHg



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14.12.2009

Druckwerte

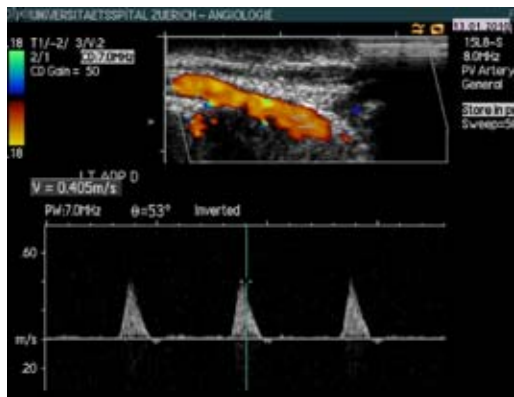
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ABI	>1,3	>1,3
Grosszehendruck rechts	50mmHg	links 10mmHg



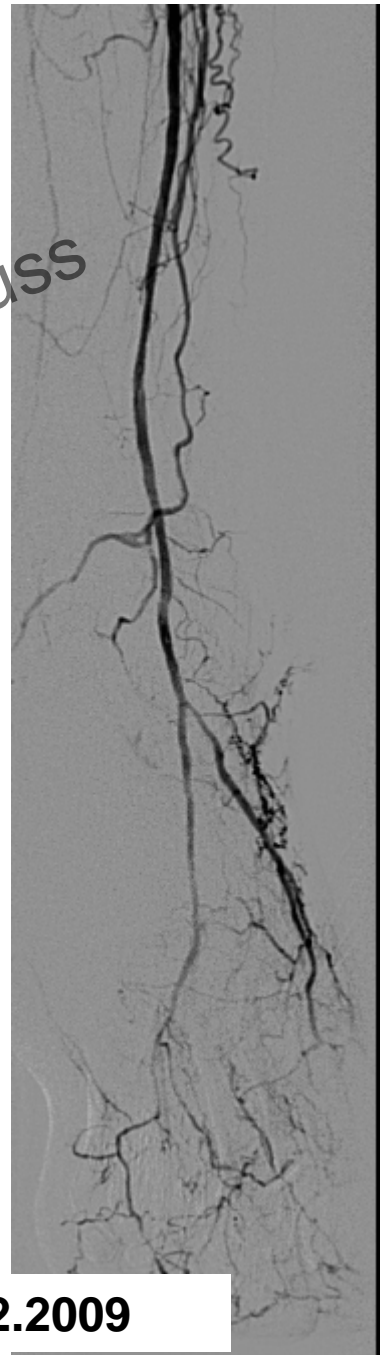
13.1.2010

Druckwerte

	rechts	links (mm Hg)
Oberarm (RR)		145/65
A. dors.pedis	>200	>200
A. tib.post.	>200	>200
A. fibularis	>200	>200
Grosszehe	105	125



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30.12.2009

Drug-eluting Balloons



BACKGROUND: Drug-eluting stents reduce restenosis in coronary arteries, but clinical trials have failed to prove their efficacy in peripheral arteries. We investigated the use of paclitaxel-coated angioplasty balloons and paclitaxel dissolved in the angiographic contrast medium during angioplasty of the leg.

DESIGN: In a small, multicenter trial, we randomly assigned 154 patients with stenosis or occlusion of a femoropopliteal artery to treatment with standard balloon catheters coated with paclitaxel, uncoated balloons with paclitaxel dissolved in the contrast medium, or uncoated balloons without paclitaxel (control). The primary end point was late lumen loss at 6 months.

RESULTS: The mean (±SD) age of the patients was 62±11 years, 34% were smokers, and 40% had diabetes. Twenty-seven percent of the lesions were total occlusions, and 30% were chronic lesions. The mean lesion length was 7.6±5.5 cm. There were no significant differences in baseline characteristics between the groups. The mean late lumen loss attributable to the paclitaxel-coated balloons, uncoated balloons with paclitaxel dissolved in the contrast medium, and uncoated balloons was 1.7±1.1 mm in the control group (n=52), 1.6±1.2 mm (P=0.001) in the group treated with paclitaxel-coated balloons (n=52), and 1.6 mm (P=0.13) in the group treated with paclitaxel dissolved in the contrast medium. The rate of revascularization of target lesions at 6 months was 20% (17%) in the control group, 2 of 41 (4%) in the group treated with paclitaxel-coated balloons (P=0.001 vs. control), and 11 of 52 (21%) in the group treated with paclitaxel in the contrast medium (P=0.43 vs. control). At 6 months, the rates increased to 26 of 52 (42%), 7 of 41 (17%), and 21 of 52 (40%), respectively.

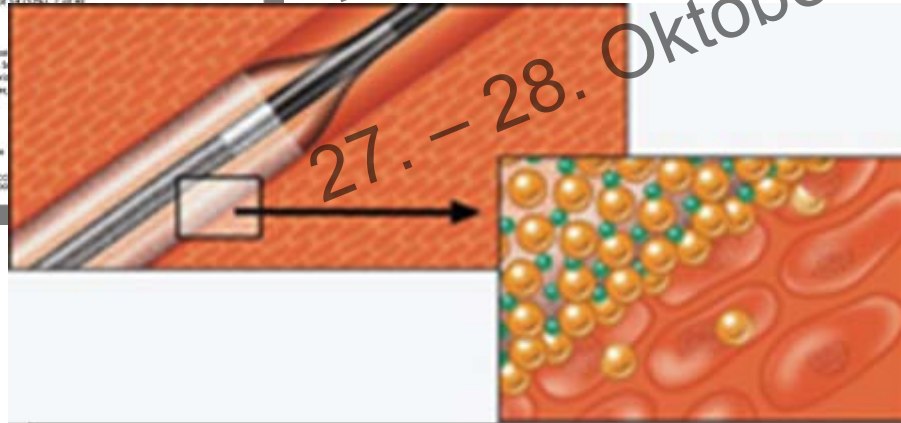
CONCLUSIONS: Use of paclitaxel-coated angioplasty balloons during percutaneous coronary intervention is associated with significant reductions in late lumen loss and target lesion revascularization. No significant benefits in late lumen loss or target lesion revascularization were seen with paclitaxel dissolved in contrast medium. (ClinicalTrials.gov number: NCT00110001.)

DOI: 10.1056/NEJMoa1000000

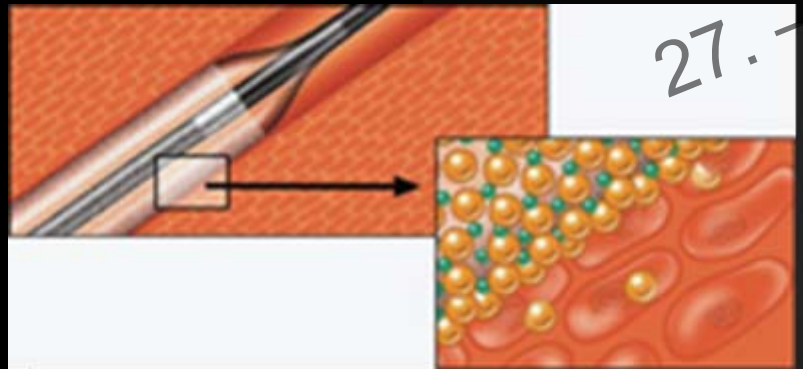
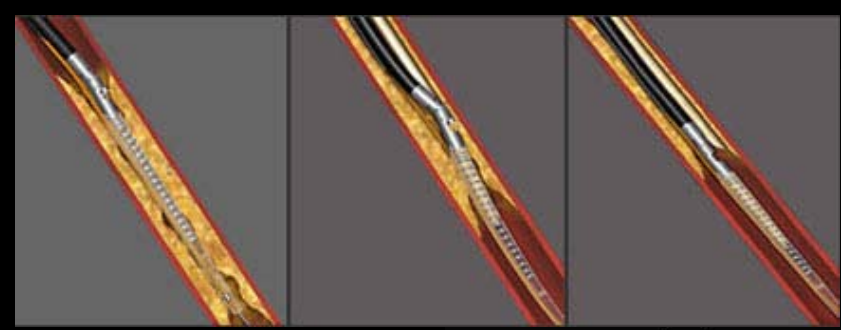
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- > Lokale Abgabe der antiproliferative Medikament (paclitaxel)
- > Positive Ergebnisse in den ersten Studien (NEJM 2008;358;689-699)
- > Viele „ongoing“ Studien in femoro-poplitealen sowie kruralen Bereich



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27.1.2010



Antithrombotika nach Kathetereingriffen

Risikokonstellation	Empfohlene Behandlung
PTA oberhalb des Knies wegen Stenose, Restenose oder Verschluss bei Claudicatio	Unbefristet ASS
PTA oberhalb des Knies wegen Stenose, Restenose oder Verschluss bei kritischer Ischämie	Unbefristet Clopidogrel
PTA am Unterschenkel wegen Stenose oder Verschluss bei Claudicatio	1 Monat dual ASS/Clopidogrel, danach ASS unbefristet
PTA am Unterschenkel wegen Restenose bei Claudicatio	1 Monat dual ASS/Clopidogrel, danach Clopidogrel unbefristet
PTA am Unterschenkel wegen Stenose, Restenose oder Verschluss bei kritischer Ischämie	1 Monat dual ASS/Clopidogrel, danach Clopidogrel unbefristet
PTA von Stenosen der oberen Extremitäten, der Nierenarterien, von Transplantatarterien oder von Hämodialyse-Shunts	Unbefristet ASS
Stent Ober- oder Unterschenkelarterie bei Claudicatio	1 Monat dual ASS/Clopidogrel, danach ASS unbefristet
Stent Ober- oder Unterschenkelarterie bei kritischer Ischämie	1 Monat dual ASS/Clopidogrel, danach Clopidogrel unbefristet
Stent supraaortale Arterie, Nierenarterie, Transplantatarterie oder Karotis	1 Monat dual ASS/Clopidogrel, danach ASS unbefristet
Stent Hämodialyse-Shunt	Unbefristet ASS

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THERAPIE: Mikroangiopathie

→ Zuckereinstellung: Metformin (präventiv) / Insulin

→ **Ilomedin** v.a. auch bei schwerer Makroangiopathie

↓ Ruheschmerzen: RR 1.32 (95% CI 1.10 to 1.57)

↓ Ulkus: RR 1.54 (95% CI 1.22 to 1.96)

↓ Major Amputationen: RR 0.69 (95% CI 0.52 to 0.93)

NW: Kopfschmerzen, Flush, Nauseas, Erbrechen, Diarrhoe

Konklusion

Diabetisches Fussyndrom ist häufig: Makro- und Mikroangiopathie

- **Angiologische Abklärung der Makro-/Mikrozirkulation bei**
 - Diabetikern
 - Trophischen Läsionen
 - vor fussorthopädischen Operationen

- **Angiologische Follow-up nach Gefässinterventionen**

