Diabetic Foot Syndrome
A nursing challenge?
**Diabetic Foot Syndrome**

- In Switzerland circa 350,000 people suffer from diabetes
- One tenth suffer from DFS
- 1000 amputations are carried out every year because of DFS
- One quarter of the total cost for diabetes treatment is spent on treating DFS. 1,000,000,000 CHF/Year /800,000,000 E.

Diabetic Foot Syndrome

- Circa 40-60% of all non-traumatic Amputations of the lower limb are carried out on people suffering from diabetics
- An ulcer is the cause of 85% of all lower limb amputations
- Four out of five ulcers are caused by trauma

International consensus on Diabetic Foot Disease 1999, 2007, 2010
What is Diabetic foot Syndrome?
Diabetic Foot Syndrome

- Infection, Ulceration and/or Destruction of tissue with neurological anomalies and Peripheral vascular disease of the lower limb

Diabetic Foot Syndrome

- Diabetes mellitus
  - Neuropathie
  - Osteoarthropathie
  - PAVK
- Trauma/Ulkus
  - Infektion
  - Ischämie
- Amputation
Macro-vascular-angiopathy

- Deposits of fat, blood-clots, connective tissue and small amounts of calcification on the blood-vessel walls.
Macro-vascular-angiopathy

- Arteriosclerosis: a hardening of the arteries also referred to as arterial stiffness. It is a normal part of the aging process but the process is accelerated in the presence of diabetes and affects 68.6% of the leg arteries. It is complicated by the metabolic syndrome, smoking, and hypertension.

- Atherosclerosis: a build-up of “plaque”, on the artery wall. It is the result of the proliferation followed by destruction of intimal tissue, and is complicated by inflammation and the inflammatory process.

- Mönckeberg Sclerosis: is the calcification of the Tunica Intima and Media of the arteries and causes hardening and loss of flexibility of the blood vessel. It is thought to be caused by autonomic neuropathy.
Macro-vascular-angiopathy

The neuroischemic foot is pale, dusky, shiny and cold with no foot pulse (dorsalis pedis or tibialis posterior). The nails are brittle and malformed and hair growth may be absent or abnormal. If lesions occur they are usually on the edges of the foot and are caused by ill-fitting footwear or trauma.
Neuroischemic foot
Macro-vascular-angiopathy
Micro-vascular-angiopathy

- Micro-vascular-Angiopathie refers to changes which occur in the microcirculation or miniscule blood vessels, leading to the neuropathic foot.
Micro-vascular-angiopathy

- Hyperglycaemia and/or advanced glycation end-product (ACEs) cause sugar-protein connections in tissue that lead to structural changes in the blood vessel.
  - The acral blood-vessels are affected.
  - But also the kidneys and eyes.
Micro-vascular-angiopathy

- The main known problems in Micro-vascular-Angiopathy are Neuropathy
Motor Neuropathy
Tanenberg et al 2001
Motor Neuropathy
Leitlinien für die Praxis, Internationalen Konsensus über den Diabetischen Fuss, 1999
A-V Shunt, Tanenberg et al 2008
Mediasklerose

Mönckeberg Sclerosis is the calcification of the Tunica Intima and Media of the arteries and causes hardening and loss of flexibility of the blood vessel.
Reduced joint movement

Böni T. Vortrag Klinik Balgrist, 2009
Osteonecrosis is today a recognised complication of diabetic micro-vascular-Angiopathie
The neuropathic foot

The neuropathic foot is generally dry and warm. The foot pulse is deceptively strong, because of Arterial-Venous Shunts. Callus or lesions caused by lack of protective footwear may be present on the plantar surface.
Charcot Arthopathy

Neuro-osteo-arthopathy can be divided into three phases, 1: acute onset, 2: bone destruction and 3: consolidation and stabilisation. The onset is generally sudden, with mild pain and swelling following an apparently minor injury.
Charcot Arthropathy

**Stage 0**
Prodromal period

- Swelling
- Local warmth
- Mild erythema
- Clinical instability
- Radiographic changes are absent or minimal

**Stage 1**
Development

- Debris formation at articular margins
- Fragmentation of subchondral bone
- Subluxation
- Dislocation
- Erosion of articular cartilage
- Bone resorption
- Osteolysis and osteopenia
- Disorganization and fragmentation of bone
- Soft tissue edema
- Increased joint mobility

**Stage 2**
Coalescence

- Lessening of edema
- Absorption of fine debris
- Healing of fractures
- Fusion and coalescence of larger fragments
- Loss of vascularity
- Sclerosis of bone

**Stage 3**
Reconstruction

- Further repair and remodeling of bone
- Fusion and rounding of large fragments
- Revascularization
- Diminution of sclerosis
- Restoration of stability
- Increased bone density
- Exuberant ossification
- Deformity

**Resorption of bone**

**Repair**
Prevention

- Metabolic
- Mechanic
- Education
Joslin Clinic Boston Diabetes Care Management

Diet

Movement and sport

Medication

Self-controls
Classifikation according to DESG (Deutsch Schweiz)

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Protect feet from injury

- Never go barefoot
- Wear correct socks. Natural fibres preferably without seams
The perfect shoe

Wund-Management Probst & Vasel-Biergans

- Ausreichend lang
- Ausreichend hoch
- Weiches, geschmeidiges Leder
- Keine fühlbaren Innennahte
- Schnürsenkel oder Klettverschluss
- Stoßdämpfendes Fußbett
- Max. 20 mm Absatz
- Ausreichend breit
The problem shoe

Wund-Management Probst & Vasel-BiergansThe
How nails should be cut

Leitlinien für die Praxis, Internationalen Konsensus über den Diabetischen Fuss, 1999
Protect from injury

- Correct Footwear

- No hotwater bottles or heated blankets

- Protect from heat and cold

- No hot-to-cold baths (Kneipp)
Protect from injury

➢ Place or draw attention to the placing of furniture so that injury is not possible

➢ Repair, have repaired or draw attention to broken floortiles or uneven floor surfaces
Foot care

- Daily Foot-control
- File nails only
- Remove callus with a pumice stone or an emery board
- Footbaths only when the skin is intact, lukewarm and for a short time
- Dry the feet carefully
- Moisturise
How to check feet
Wund-Management Probst & Vasel-Biergans

1 Glance

- The shoe
  - Do you see signs of wear or pressure on the outside leather?
  - Is the heel worn?
  - Is the heel higher than two fingers?
2 Glance

- The socks
  
  Take the socks off.
  
  Check for moisture, blood or wound secretions. These are possible signs of injury.
3 Glance

➢ The feet

Look at the naked feet.

Look for injury, callus or neglect
4 Glance

- Look at the interdigital spaces. By spreading the toes it is possible to see the skin.
  - Is the skin wet?
  - Is it because of lack of care?
  - Is drying between the toes possible?.
  - Are there signs of mycosis?
5 Glance

- The nails
  - Look at the nails
  - Look at the shape.
  - Look at how the nails have been filed/cut.
1 Grasp

➢ The shoes
Feel the shoe.
Can you feel the shape of the toes?
Is the heel intact or worn?
2 Grasp

Shoes:
Feel the inside of the shoe with your bare hand.
Are there hard patches?
Is the lining intact?
Are there seams on the lining?
Are there hard transitions of the interior sole to the foot bed?
3 Grasp

- The socks
  Feel the sock with your bare hand.
  Is it wet?
  Are there seams?
  Is it hard?
4 Grasp

➢ The Feet:
Examine the naked foot with the naked hand.

Controle the humidity and temperature.
Is the skin smooth?
Is there callus formation on the sole?
5 Grasp

➢ The foot sole
Feel each sole from the toe tips to the heel.
Is there scartissue?
Is there callus formation? How much?
Very important

Document the findings
Footcare and not Bathroom surgery
Treatment
What do we do?

Palliative or curative
Curative. What do we do?

- Wetphase
- Dryphase
- Woundbed Präparation
- Dressing
- Fixation
- Offload
The wet phase

Uptake of the fluid from the wrap

During the first 10–15 minutes fluid is released from the wrap onto the wound bed and skin

Uptake of remaining fluid and start of evaporation

Body temperature

10–15 minutes after warming due to body temperature evaporation occurs leading to cleansing and cooling. This soothes and reduces inflammation

Dry phase

In the next minutes to a maximum of six hours evaporation continues, providing cleansing: the guaze is saturated with debris, exudate and pathogens – changing it is required
Dressings

- Hydroactive
  - Suprasorb® Liquacel
- Alginate
  - Suprasorb® A
- Silver dressings
  - Suprasorb® A +Ag
- Hydrobalance
  - Suprasorb® X+PHMB
- Tulle dressings
  - Lomatuell® H
- Absorption
  - Vlivasorb
Wound Dressings
Teamwork

- Diabetes specialist
- Other specialist
- Vascular surgeon
- Radiologist
- Eye specialist
- GP
- Community Nurse
- Tissue Viability nurse
- Shoemaker
- Diabetes Nurse counsellor
- Dietician
- Podiatrist

Patient and family