PRIZE ORALS

[Paul Brand Award Oral] HOW TO EFFECTIVELY OFFLOAD PATIENTS WITH DIABETIC FOOT AT HOME?

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Aim: Offloading is one of the very important parts of treatment in diabetic foot management. Noncompliance in offloading leads to prolonged healing and chronicity of the ulceration. Health care professionals are used to educate diabetic patients at foot clinics. Aim of our study was to assess how to effectively offload patients with diabetic foot not only staying outside, but when being at home.

Method: A survey with anonymous questionnaire was performed at our out-patient foot clinic. Allover 54 consecutive repeatedly educated patients fulfilled the questionnaire in March 2017 [72 % of male, most frequent age group 61-70 years (53.7%), predominantly secondary education (50%), 85.2% of pensioners]. The data were statistically processed.

Results/Discussion: 53.7% of patients had non-healed foot ulcer in the time of fulfilling the questionnaire. 57.4% of patients spend at home more than 10 hours a day, excluding time to sleep. Concerning type of home footwear, 38.9% of subjects are used to wear common slippers, 27.8% wear slippers bought in medical supplies shop, 14.8% wear orthosis and 18.5% are used to walk barefoot/socks only at home. In a subgroup of patients with non-healed ulcer, 44.8% of subjects spend at home less than 10 hours a day (excluding time to sleep). 41.4% of these non-healed patients wear common slippers at home, 24.1% wear slippers bought in medical supplies shop, 20.7% wear orthosis and even 13.8% are used to walk barefoot/socks only. 48.3% of subject use crutches just during outside walking instead of all the time use.

Conclusion: Our survey showed that despite receiving systematic education at foot clinic, diabetic foot patients understand being outside or at home as two different situations. Although they offload outside, patients are often noncompliant with use of the offloading tools at home. Effective re-education in this issue is permanently relevant.

[Prize Oral 1] REDUCING DIABETES RELATED AMPUTATIONS FOLLOWING INTRODUCTION OF VALIDATED COMMISSIONING CRITERIA IN ONE UK REGION

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Aim: To ascertain underlying causes of the very high diabetes related major lower limb amputation rates (DRMLEAS) in one region of England (6 million inhabitants, 8% with diabetes, 95% white British ethnicity) and effect improvement.

Method: A process of service review commenced in one provider area (secondary care hospital, community podiatry team and primary care facilities) total population 280,000 in 2007. Shortcomings were identified and addressed. A set of 10 detailed service standards required to minimise avoidable DRMLEAS was developed. These were then assessed in all 14 provider areas in the region and recommendations made to each in 2013 to improve practice. Peer reviews of each provider area were made in 2015 and DRMLEAS in that year compared to a rating out of ten for service provision

Results/Discussion: In the initial provider area DRMLEAS decreased from >3/1000/year before 2008 to <1.0/1000/year from 2009 until the present (P, 0.01). New diabetic foot ulcer rates/1000/year stabilised. There was a strong correlation between service score and DRMLEAS ($r=0.9$, $p<0.001$). In areas where service provision score improved from 3 or less to over 8, DRMLEAS fell within 2 years from >1.5 to <0.8/1000/year (0.8=national average). Where service score remained poor, DRMLEAS remained high. In one provider area (500,000 population) three year total diabetes related amputations varied across primary care facilities from a mean for all 65 practices of 4.7 +/-3.6 (CI 3.8 to 5.6) total amputations per 1000 with diabetes (annualised from 3 year data) to 8.9 (CI 7.5 to 9.9) for the 8 practices with reduced access to podiatry. Pearson's Chi-squared test p-value = 9.372e-10 high amputation rate group vs total mean.

Conclusion: Detailed evaluation of efficacy of diabetes foot care provides a valid tool to commission improvements in service which can if applied result in a rapid reduction in avoidable diabetes related amputations.

[Prize Oral 2] IMPACT OF BELOW-THE-ANKLE PERIPHERAL ARTERIAL DISEASE ON THE OUTCOMES OF DIABETIC PATIENTS WITH ISCHEMIC FOOT ULCERS

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Aim: To evaluate the role of below-the-ankle peripheral arterial disease (BTA-PAD) in diabetic patients with ischemic foot ulcers.

Method: Consecutive diabetic patients with ischemic foot ulcers who referred to our diabetic foot unit were prospectively considered for revascularization according to a preset limb salvage protocol. All revascularization procedures were performed by percutaneous transluminal angioplasty (PTA). All patients had continuous follow-up until ulcer-healing or death. Patients were divided in two groups: BTA-PAD+ and BTA-PAD- according to the involvement of foot vessels (plantar arteries and/or pedal artery) or not, evaluated blindly by expert interventional radiologists on the basis of the angiographic procedures. After one year of follow-up the following outcomes were evaluated: non-healing, minor amputation (below the ankle), major amputation (above the ankle), revascularization failure (technical recanalization failure of the vessel affected without direct arterial flow to the foot and/or absence of distal run-off), recurrence of critical limb ischemia (CLI) after revascularization (pain relapse, new ulcer or non-healing with TcPO2 < 30 mmHg).

Results/Discussion: A total of 272 patients were included (age 68,9±9,6 years, males 72,8%, type 2 diabetes 90,4%, diabetes duration 20,7±11,6 years, HbA1c 62±22 mmol/mol): 120 (44,1%) with BTA-PAD and 152 (55,9%) without BTA-PAD. The outcomes for BTA-PDA+ and BTA-PAD- were respectively: non-healing (58,3 vs 26,3% p<0.0001), minor amputation (80,3 vs 20,9% p<0.0001), major amputation (18,3 vs 6,6% p=0.002), PTA failure (38,6 vs 11,1% p<0.0001) and CLI recurrence (33,3 vs 17,1% p=0.002). At the multivariate analysis of all predictors found at univariate analysis, BTA arterial disease resulted an independent predictor of non-healing [HR 2.1 (CI 95% 1.4-3.3) p=0.0001], (minor amputation [HR 3.1 (1.5-5.9) p<0.0001], PTA failure [HR 3.5 (1.9-6.3) p=0.0001] and CLI recurrence [HR 2.8 (1.2-4.1) p=0.0001]. BTA-PAD+ showed lower values of TcPO2 and ΔTcPO2 1 month after revascularization than BTA-PAD- (38±13 vs 47±11 mmHg p<0.0001) and (20±13 vs 25±10 mmHg p=0.0002). Dialysis and age were independently related to BTA-PAD.

Conclusion: BTA-PAD appears to be a specific pattern of PAD in diabetic patients with ischemic foot ulcers. BTA-PAD is related to non-healing, minor amputation, PTA failure and CLI recurrence. Dialysis and age are independent risk factors for BTA-PAD.

[Prize Oral 3] RECURRENCE OF DIABETIC FOOT ULCERS: 10-YEAR FOLLOW-UP ANALYSIS IN EURODIALE SUBGROUP

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Aim: The most of recently published studies are focused on acceleration of diabetic foot ulcers (DFU) healing, data about ulcer recurrence are lacking. The aim of the study was to analyze risk factors for ulcer recurrence in patients with healed foot during the 10-year follow-up in our foot clinic.

Method: Patients with healed study foot after completing Eurodiale study (2003-2005) were included into this follow-up. Out of 93 healed patients during our 10-year follow-up 36 patients died (38.7%) and out of 57 living patients 41 were included into this analysis (drop-out was 16 persons). Potential risk factors for ulcer recurrence were: patient-related factors - age, sex, duration and treatment of diabetes, HbA1c>60 mmol/mol, overweight (BMI>27), end-stage renal disease and other co-morbidities; limb-related factors - peripheral arterial disease (PAD), osteomyelitis, Charcot foot and increased CRP; foot status (ulcer size and depth, ulcer location, previous amputation, local signs of infection) and miscellaneous factors (distance from foot centre, smoking, chronic alcohol use). All risk factors were assessed by the first presentation of foot ulcers during the entry visit of Eurodiale study. Chi-square test and stepwise logistic regression were used for statistical analysis.

Results/Discussion: The ulcer recurrence was observed in 33/41 (80.5%) of patients during 10-year follow-up. Out of those 33 patients 1 recurrence was observed in 10 persons (30.3%), 2 recurrences in 7 patients (21.2%) and 3 or more recurrences in 17 patients (48.5%). Plantar location of the ulcer ($p<0.001$), previous minor amputation ($p=0.031$) and distance from foot centre ($p=0.037$) were significant risk factors for ulcer recurrence in univariate analysis. Stepwise logistic regression revealed that distance from foot centre (OR 5.02, 95% CI 0.92–27) was an independent predictor for recurrence of DFU. Other assessed risk factors were not significant in stepwise logistic regression.

Conclusion: Results of our study proved very high risk of DFU recurrence. Main risk factors for ulcer recurrence were higher distance from foot centre, status after previous minor amputation and plantar location of the ulcer. These results reflect the importance of regular and frequent check-up visits of healed patients especially in local foot clinics.

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ORAL ABSTRACTS

[O1] REPORTING THE ASSESSMENT OF NEW DIABETIC FOOT PRESENTATIONS IN SPECIALIST CLINICS ACROSS EUROPE: FOCUS ON PATIENT PERCEPTIONS AND THE POSSIBLE IMPACT ON THEIR MANAGEMENT

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Introduction: This study aims to assess a patient's perspective of their new diabetic foot problem at the time of 1st presentation in a specialist diabetic foot clinic, to understand their pre-conceptions and thoughts that may impact on their management.

Method: Consecutive patients affected by a new diabetic foot problem were sampled from June to August 2016 and assessed at first presentation in 11 specialist diabetic foot centers across Europe (France, Germany, Italy, Spain and England). A standardize questionnaire was designed and completed by each patient and collated information on patient demographics, their perceptions of the duration and severity of their foot problem, their referral pathway to specialist clinic and patient assessment of characteristics of complaint. Analysis was conducted to correlate perceptions with diabetes type, patient presentation and clinically assessed severity.

Results/Discussion: In total 370 consecutive new patients were recruited. The mean age was 66.9±15.9 years the majority being men (68.9%) and type II Diabetes (87.6%). The main documented foot problem was ulceration (74.1%) and the duration of the foot problem was between 1- 6 months in 46.8%; but in 20.3% the problem had been there greater than 6 months at assessment. Fifty-percent of patients perceived their problem as mild. However, at the time of referral 52.1% had ischemic ulcers, 51.5% had infected ulcers, 30.6% had ischemic-infected ulcers 22.2% had an ulcer classified as IIID according to University of Texas Classification (UTC). Inversely, 30% of the patients with an ulcer classified I UTC considered their problem as severe. In total 27.3% of patients have never checked their feet and 28.9% have never received any warning about the risk of their feet.

Conclusion: A patient's subjective assessment of their foot problem appears to underestimate clinical urgency. Thus the patient's poor perception of the diabetic foot "at risk" may delay clinical assessment and specialist referral, which could negatively impact outcomes. Understanding these results may reclaim a lost opportunity to improve outcomes.

[O2] FIVE YEAR MORTALITY FOLLOWING DIABETIC AMPUTATION HAS NOT CHANGED OVER 14 YEARS

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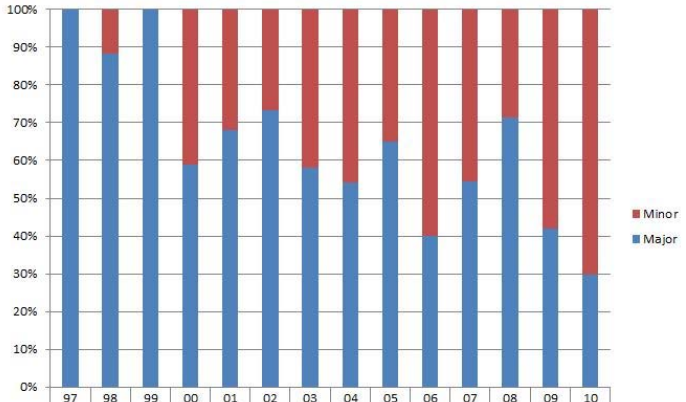
Aim: Diabetes is the most common cause of non-traumatic limb amputations. The consequences of undergoing an amputation remain significant. There is an increased risk of mortality compared to non – diabetic patients. Other factors such as the emotional impact and the associated rehabilitation programme also need to be taken into account. There is higher 5- year mortality following diabetes related amputations which is about 70% as per NICE literature review. We wanted to study if this has changed over the last 14 years in our cohort.

Method: This was a retrospective study on 356 patients who underwent amputation between 1997 and 2010. List was obtained from discharge summary and theatre record. Subjects who underwent amputation between 1997 - 2003 were 'Early' cohort and those between 2004 – 2010 were 'Late' cohort. Amputations were grouped at their first surgery into major (above ankle) or minor (below ankle). Electronic database was examined in 2016 to know the date of their death. The cause of death could not be ascertained.

Results/Discussion: There was no difference in the mean number of total amputations performed annually between early and late cohort (25 +/- 8.8 vs 25.9 +/- 4.9; $p > 0.05$), however there was a significant reduction in major amputations performed annually (18.4 +/- 3.9 vs 12.9 +/- 3.2; $p = 0.01$) and a trend for a rise in minor amputations (6.6 +/- 6.3 vs 13.0 +/- 5.1; $p = 0.07$) between these cohorts. 5-year mortality was 59% which was significantly higher in major amputation group than minor (63.9% vs 51.1%; $p = 0.02$). There was no difference between 'Early' and 'Late' cohorts in 5-year total mortality (60.1% vs 57.4%; $p > 0.05$), major amputation mortality (63.2% vs 64.0; $p > 0.05$) or minor amputation mortality (43.9% vs 52.8%; $p > 0.05$).



	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Minor	0	2	0	16	7	8	13	11	7	15	15	6	18	19
Major	22	15	14	23	15	22	18	13	13	10	18	15	13	8

Conclusion: There has been no change in total mortality with time in subjects with diabetes who needs lower limb amputations. There is significant reduction in major amputation with

increase in minor amputation between these cohorts. The change in amputation level started with the introduction of multi-disciplinary diabetic foot clinic in 2001.

[O3] COMPARISON OF LONG-TERM OUTCOMES IN DIABETIC PATIENTS WITH CRITICAL LIMB ISCHEMIA TREATED BY AUTOLOGOUS CELL THERAPY, PERCUTANEOUS ANGIOPLASTY OR CONSERVATIVE THERAPY

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Aim: Long-term clinical outcomes of revascularization, especially by autologous cell therapy (ACT), in diabetic patients with critical limb ischemia (CLI) remain unclear. The aim of our study was to compare the mortality and amputation rates of patients with diabetic foot (DF) and CLI treated by ACT with patients treated by percutaneous transluminal angioplasty (PTA) and patients treated conservatively.

Method: One-hundred and thirty patients with DF and no-option CLI (defined as transcutaneous oxygen pressure – $TcPO_2$ < 30 mmHg after unsuccessful standard revascularization) treated in our foot clinic over 5 years were enrolled into the study. Forty-five patients were treated by ACT, 43 patients underwent re-PTA and 42 patients were treated conservatively and formed the control group. Mortality and major amputation rate were assessed over 3 years of follow-up. ANOVA test with Bonferroni correction was used for statistical analysis.

Results/Discussion: Patients in all groups did not differ significantly in basic characteristics. Frequency of comorbidities (hypertension, ischemic heart disease, end stage kidney disease) and immunosuppressive therapy did not differ significantly among the groups. Patients in ACT and control groups had significantly more severe angiographic findings according to Graziani classification than re-PTA group (5.0 ± 0.9 and 5.1 ± 0.8 vs. 3.5 ± 1.1, $p < 0.001$), but there was no significant difference in baseline values of $TcPO_2$ among all groups. The rate of major amputation after 3 years was significantly lower in ACT and re-PTA groups in comparison with control group (22.2 % and 11.6 % vs. 47.6 %, $p = 0.015$ and 0.003 respectively). There was a trend to lower mortality in ACT group and significantly lower mortality in re-PTA group in comparison with control group (24.4% and 16.3% vs. 42.9%, $p = 0.11$ and 0.009 respectively).

Conclusion: Our study showed significantly lower long-term amputation rate and increased survival in patients treated by ACT and re-PTA in contrast to patients treated conservatively.

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[O4] SCREENING MDT, UNDERPRESSURE!

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Aim: Compare screened risk classification to biomechanical risk classification using plantar pressure for the diabetic foot.

Method: Neuropathic diabetic patients were screened in clinic using the SCI-DC foot risk stratification tool and classified as low, moderate or high risk of developing an ulcer. Demographic data was taken and as part of normal treatment all patients received footwear and custom made foot orthotics. In-shoe plantar pressure data was captured using the Pedar system (Novel, Germany) for walking at a self-selected pace in their own footwear with a sham insert (3mm flat Poron) and a custom made foot orthotic. Peak pressure data was determined for the forefoot over the duration of stance. Patients were classified into high or low dynamic biomechanical risk based on the 200kPa pressure threshold outlined by Owings etal. Linear relationships were assessed via Pearson's correlation, paired t-tests were used to assess orthotic effect.

Results/Discussion: 67 patients (58M, 9F). Mean age of 64.2, BMI of 31.1. Based on clinical screening 1% of patients were classified as low, 67% moderate and 32% high risk of ulceration, while 72% were identified as high risk based on biomechanical risk with a weak positive correlation observed between screening methods ($r=0.32$, $p<0.01$). Foot orthotics were effective at reducing biomechanical risk in only 8% of cases, however peak pressure was reduced in the forefoot for 88% of cases demonstrating a clinically relevant effect of foot orthotics. Mean peak pressure for the forefoot was found to be 295.8kPa (±127.68kPa) for the in-shoe and 246.06kPa (±87.95kPa) with an orthotic, giving a significant difference of 49.74kPa ($t=-4.332$, $p<0.001$) and moderate positive correlation ($r=0.68$, $p<0.01$) suggesting orthotics had greater effect when initial pressures were high.

Conclusion: Classification of ulcer risk based on clinical screening and subsequent management strategies do not capture the biomechanical risk present, but does provide a weak predictor for higher peak pressure in the forefoot. Improved biomechanical risk analysis is required to more accurately predict the peak pressure threshold for ulceration risk across a range of diabetic foot pathologies and to provide a clearer guidance on the effect of orthotic interventions on this risk.

[O5] NEGATIVE PRESSURE WOUND THERAPY EFFECT IN DIABETIC FOOT ULCER MAY BE MEDIATED THROUGH DIFFERENTIAL GENE EXPRESSION

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Aim: Diabetic foot syndrome (DFS) frequently leads to patient disability due to foot and leg amputations. Negative pressure wound therapy (NPWT) has been successfully used for ulcerations in DFS. However, its mechanisms of action on the molecular level are not fully understood. The aim of this research was to assess the effect of NPWT on the gene expression.

Method: We have included 21 type 2 diabetes (T2DM) patients with foot ulcer treated with NPWT and 8 T2DM patients treated by conventional debridement. Tissue samples were obtained from the bottom of the ulceration at two time points: before the therapy was started and after 8 days of treatment. Total RNA was extracted and gene expression profiling was performed by means of human gene expression arrays*. Differential expression of mRNAs was performed using the standard R Bioconductor pipeline based on 'limma' package.

Results/Discussion: The studied groups were similar in terms of age at the examination 69.0 ± 8.3 vs. 67.5 ± 4.3 years (p=0.62), sex: 80,9% vs. 75,0% male (p=0.72), T2DM duration: 14.7 ± 7.1 vs. 14.9 ± 6.0 years (p=0.95), and other basic clinical characteristics. We identified 6 genes with differential expression ($p<0.05$) between the two time points studied (after the Benjamini-Hochberg correction for multiple testing). Expression of only one of them - RRP7A which is involved in rRNA processing - increased over 2-fold after the treatment (logFC = 0.322, p=0.032), while the remaining 5 genes were downregulated. Two of differentially regulated genes - CYP27A1(logFC=-0.57, p=0.02) and CLYBL (logFC=-0.08, p=0.034)- associate with mitochondrial function. Two other genes - SRGAP3 (logFC = -0.14, p=0.013) and TRAPPC6A (logFC = -0.12, p=0.032) are associated with endoplasmic reticulum and Golgi apparatus, respectively. Finally, the KIAA1683 gene (logFC = -0.105, p=0.035) encodes a protein interacting with Calmodulin (CaM) messenger protein, which specific function has yet to be determined.

Conclusion: In summary, we found initial evidence that NPWT effect in diabetic foot ulcer may be mediated through differential gene expression. This finding requires further confirmation.

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[O6] 5-YEAR FOLLOW-UP OF PATIENTS WITH DIABETES ON HAEMODIALYSIS

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Aim: End-stage renal disease (ESRD) is an independent risk factor for diabetic foot disease. The aim of this study was to determine outcomes at 5 years of a cohort of patients with diabetes attending a haemodialysis unit.

Method: In 2012 a study was carried out to investigate the podiatric needs of patients with diabetes on renal replacement therapy. This single-centre study involved a convenience sample of 44 patients attending a haemodialysis unit. Using available data this cohort of patients was re-examined on the basis of mortality, prevalence of lower limb pathologies, evidence of peripheral arterial disease (PAD), cardiovascular disease (CVD) and smoking history.

Results/Discussion: The outcome at 5 years indicated a mortality of 70%, which is comparable to published data. Of the remaining 30% (n=12), 4 patients underwent successful renal transplants. With regard to lower limb pathologies 54% had neuropathy, which was of similar incidence in the deceased (58%). However PAD was significantly higher in the deceased group compared to the survivors (85% v 14% respectively). Of the surviving group 23% had a history of Charcot, with two cases occurring during the follow-up period. Foot ulceration occurred in 54% of the surviving group, while 42% of the deceased had active ulceration at time of death. Major amputation was reported in 13% of the deceased patients (one bilateral). One major amputation occurred in the surviving group and this occurred in a patient who declined podiatric care. Smoking prevalence in those who died was almost twice that of the surviving patients (42% v 23%). There was also a higher rate of CVD (52% v 30%) in the deceased group.

Conclusion: This study further highlights the high rate of mortality and podiatric morbidity of this patient population. Mortality appeared to be associated with a higher incidence of PAD, with higher rates of CVD and smoking history also occurring in the deceased group. This may be useful to consider when establishing renal-podiatry programmes. Early identification of risk factors in patients commencing dialysis, implementation of interventions for smoking cessation and aggressive targeting of CVD may be useful in improving outcomes for this group.

[O7] DIAGNOSTIC ACCURACY OF 99MTC-HMPAO-LABELED LEUCOCYTE SCINTIGRAPHY FOR DIABETIC FOOT OSTEOMYELITIS IN RELATION TO FOOT PART INVOLVED AND IMAGING TECHNIQUE

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Aim: Imaging diagnosis of diabetic foot osteomyelitis (DFO) is complex as coexistent soft tissue infection (STI) or Charcot osteoarthropathy (COA), may obscure DFO findings and hamper diagnosis in an anatomy-dependent manner, and imaging technique (planar, tomographic or hybrid) can substantially affect diagnostic accuracy. The study is aiming to evaluate ^{99m}Tc-HMPAO-labeled leucocyte scintigraphy (LS) in DFO diagnosis, in relation to foot part involved and imaging technique.
Method: 168 patients with 207 sites clinically suspect for DFO were investigated by planar LS. Sites were divided into Group-1 (137 forefoot sites, 130 with contiguous ulcer) and Group-2 (70 mid/hind foot sites) further subdivided into subgroups 2a (49 sites with ulcers, 23 with COA) and 2b (21 sites without contiguous ulcer). 80 sites were further investigated by SPECT/CT. Focally increased leucocyte bone uptake was considered positive for DFO. Final diagnosis was based on clinical and radiological follow-up or histopathological findings.

Results/Discussion: Among the 207 sites investigated, final diagnosis was DFO in 74 sites, acute COA in 18, STI in 96 and no infection in 19. In the forefoot sensitivity, specificity, accuracy, positive (PPV) and negative predictive value (NPV) of planar LS for diagnosing DFO were 90.9%, 91.5%, 91.2 %, 87.7% and 93.7% respectively. SPECT/CT addition improved values to 100%, 96.8%, 98.2%, 96.0% and 100%, respectively. In the mid/hindfoot planar LS sensitivity, specificity, accuracy, PPV and NPV were 88.2%, 86.8 %, 87.1%, 68.2% and 95.8% respectively. SPECT/CT addition clearly improved sensitivity to 100%, but only marginally specificity from 86.8% to 90%, due to false positive findings caused by leucocyte accumulation at sites of active bone marrow. Lowest specificity and PPV of 80% and 62.5%, respectively, were observed in subgroup-2b patients with suspected mid/hindfoot DFO without contiguous ulcers and highest acute COA prevalence.

Conclusion: LS is an accurate imaging modality for diagnosing DFO and SPECT/CT can maximize diagnostic performance of planar LS in the forefoot by optimizing discrimination between DFO and STI. Although accuracy of planar LS in the mid/hindfoot is also improved by SPECT/CT, specificity may remain suboptimal by modality-independent false-positives due to active bone marrow foci on sites of acute Charcot arthropathy.

[O8] WHAT IS THE MOST RELIABLE AND ACCURATE PLAIN X-RAY SIGN IN THE DIAGNOSIS OF DIABETIC FOOT OSTEOMYELITIS?

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Aim: To analyze the reliability and accuracy of four parameters of plain X-rays in the diagnosis of diabetic foot osteomyelitis (DFO).

Method: A cross-sectional study was conducted. Three clinicians with different levels of experience evaluated 114 x-rays of 107 patients with diabetic foot ulcers with clinical suspicion of osteomyelitis and who underwent surgery between January 2014 and December 2016. Four parameters in the x-rays were analyzed: cortical disruption (loss of cortex with bony erosion), affected bone marrow (ABM), sequestrum (devitalized bone with radiodense appearance that has become separated from normal bone) and active periosteal reaction or elevation (PR). We evaluated the accuracy of x-rays comparing with the histopathology of bone biopsy.

Results/Discussion: The prevalence of osteomyelitis in our patient population was 66.7% (22.4% acute osteomyelitis, 31.6% chronic osteomyelitis and 46% fibrosis). Table depicts the reliability and accuracy of plain X-rays in the diagnosis of DFO.

	Kappa Index	**Sentitivity**	**Especificity**
Cortical disruption	**K_{12}=0.40, K_{13}=0.40, K_{23}=0.48 (p<0.001) moderate**	0.76 (0.64-0.84)	0.47 (0.34-0.53)
Affected Bone Marrow	K_{12}=0.10 (p=0.459), K_{13}=0.20 (p=0.010), K_{23}=0.36 p<0.001) **very low**	0.66 (0.57-0.78)	0.42 (0.26-0.68)
Sequestrum	K_{12}=0.16 (p=0.055), K_{13}=0.10 (p=0.209), K_{23}=0.20 p=0.003) **very low**	0.54 (0.32-0.81)	0.68 (0.29-1)
Periosteal reaction (PR)	K_{12}=0.50 (p<0.001)**,** K_{13}=0.36 (p<0.001), K_{23}=0.26 p=0.004) moderate and very low.	0.36 (0.25-0.43)	0.75 (0.68-0.79)

Conclusion: The most reliable and accurate X-ray sign in the diagnosis of DFO was the cortical disruption with a moderate agreement among clinicians and a sensitivity of 0.76 (0.64-0.84). The presence of ABM and sequestrum were poor reliable with a very low agreement among clinicians. The less accurate X-ray in the diagnosis of DFO was the presence of PR with a sensitivity of 0.36 (0.25-0.43).

[O9] THE INFECTED DIABETIC FOOT: THE VALUE OF INFLAMMATORY BIOMARKERS TO DIAGNOSE DIABETIC FOOT OSTEOMYELITIS

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Aim: To assess the diagnostic value of erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) to diagnoses diabetic foot osteomyelitis (DFO) from soft-tissue infection (STI).

Parameter	**Sen**	**Sp**	**PPV**	**NPV**	**OR[a]**	**95% CI**
ESR (mm/h)						
> 30	0.97	0.25	0.56	0.88	**9.50**	**(3.39, 23.0)**
> 50	0.82	0.43	0.59	0.71	**3.58**	**(2.19, 5.84)**
> 60[b]	0.73	0.56	0.63	0.68	**3.56**	**(2.27, 5.56)**
> 70	0.60	0.65	0.63	0.62	**2.81**	**(1.83, 4.34)**
CRP (mg/L)						
> 3.0	0.69	0.53	0.60	0.64	**2.61**	**(1.68, 4.06)**
> 6.0	0.58	0.68	0.64	0.61	**2.84**	**(1.84, 4.39)**
> 8.3[b]	0.50	0.82	0.74	0.62	**4.62**	**(2.83, 7.54)**
> 15.0	0.28	0.91	0.77	0.56	**4.23**	**(2.27, 7.85)**
ESR & CRP[c]						
Both	0.46	0.88	0.79	0.62	**6.23**	**(3.63, 10.7)**
Either	0.77	0.52	0.62	0.70	**3.67**	**(2.32, 5.81)**
Neither	0.49	0.23	0.64	0.39	**0.28**	**(0.18, 0.44)**

Method: We evaluated 353 patients in a retrospective cohort study of diabetic patients admitted to a tertiary care center with DFO (n=177) and STI (n=176). Patient diagnosis was determined through bone culture or histopathology for DFO, and bone culture, histopathology or imaging (MRI/SPECT CT) for STI.

Results/Discussion: The optimal cutoffs determined by retriever operating characteristic (ROC) analysis for ESR and CRP to predict DFO were 60 mm/h and 8.3 mg/L. The ESR cutoff value demonstrated a sensitivity of 73% and a specificity of 56%, while the values for the CRP cutoff were 50% and 82% respectively. Combined, the sensitivity and specificity for ESR and CRP was 46% and 88%. ESR and CRP values <30 mm/h and <3.0 mg/L demonstrated a negative predictive value of 89% (table).

Conclusion: ESR value of >60 mm/h and a CRP value of >8.3 mg/L should prompt further diagnostic analysis. In such a case, the odds of the patient having DFO is approximately 6-times higher. Furthermore, in the current study, patients with normal range ESR (<30 mm/h) and CRP (<3.0 mg/L) values demonstrated only a 10.8% prevalence of DFO.

[O10] AGE AT AMPUTATION IS STRONGLY RELATED TO MORTALITY DURING 10 YEARS FOLLOW UP

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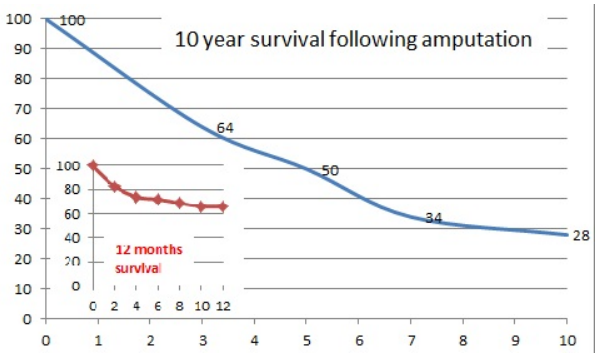
Aim: 15% of patients with diabetes develop ulcer in their life time which predisposes them to a high risk of amputations. NICE literature review suggests that in diabetes patients, up to 70% of people die within 5 years of having an amputation. There is no data on long term survival of people who had undergone amputation. We have been following up people for the last 16 years and wanted to study 10 year survival after the first recorded lower limb amputation in our cohort.

Method: This was a retrospective study on 233 patients (159 males) who underwent amputation between 1997 and July 2006. List of patients who had undergone amputation was obtained from discharge summary and theatre record. 63 subjects underwent further amputation but were grouped as their first amputation level into major (above ankle) or minor (below ankle). Electronic database was examined in August 2016 to know the date of their death.

Results/Discussion: The highest mortality was within 4 months of amputations and there was no difference between death following major or minor amputations in our series at this time. During follow up one year survival was 64%, 3 years 50%, 5 years 40%, 7 years 34% and 10 years 28%. People who died by 10 years were older (70.2 +/-11.5 vs 62.4 +/-12.2 years: P <0.0001) and had serum album level below normal at presentation (p <0.05). There was no difference in 10 year mortality between gender, presence of anaemia, eGFR, cholesterol level and HbA1c level (p>0.05) at presentation. There was no difference in 10 year mortality with amputation level.



Conclusion: Mortality was highest within 4 months, which could be due to existing co-morbidities. This could explain low albumin in severely ill patients, which was associated with death. Mortality was stable after 5 years. Old age was related to death in our study but the level of amputation was not, which could be due to 63 subjects who underwent further amputation but were grouped as their first recorded amputation.

[O11] MAJOR LOWER-EXTREMITY AMPUTATIONS IN PEOPLE WITH AND WITHOUT DIABETES IN BELGIUM, 2009-2013

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Aim: Lower-extremity amputations (LEAs), in particular major LEAs, are associated with a high morbidity and mortality rate, reduced quality of life, and high medical costs for the patient, his relatives, and the community. Nationwide data on the incidence of LEA in Belgium are lacking. Therefore, the aim of the present study is to analyze the annual first major LEA rates in patients with and without diabetes in Belgium, and to evaluate the corresponding relative risks as well as the time trends over a five-year period.

Method: Data were provided by the "Intermutualistisch Agentschap – Agence Inter-Mutualiste (IMA-AIM/)", a non-profit organization that aims to collect and analyze data provided by the Belgian national health insurance funds ; these data cover almost the whole Belgian population. All patients, both with and without diabetes, which underwent a first major LEA during the years 2009 - 2013 were identified. The corresponding age and sex standardized major LEA rates as well the relative risks were calculated. We estimated major LEA rates for each calendar year in the following manner: the number of persons with a major LEA during this year as numerator divided by the number of insured persons in the respective year as denominator. Time trends were analyzed using Poisson regression models.

Results/Discussion: During the study period 5 240 major LEAs were counted. The age–sex standardized annual major LEA rate decreased significantly in the population with diabetes from 42.3 per 100,000 person years in 2009 to 29.9 in 2013. It did not decrease in the population without diabetes (2009: 6.1; 2013: 6.0). As a result we found a strong decrease of the corresponding relative risks from 6.9 in 2009 to 5.0 in 2013. Regarding the time trends, a significant reduction in the major LEA rate was observed among persons with diabetes (8% reduction per year; 95% CI: 7%-9%), but not in the population without diabetes.

Conclusion: We found significantly reduced annual major LEA rates among persons with diabetes, but not among persons without diabetes. Relative risks of major LEA comparing the population with and without diabetes decreased significantly during the study period.

[O12] DIABETIC FOOT SURGICAL TREATMENT IN ELDERLY OVER 75 YEARS

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Aim: Treatment of elderly people represent a challenge in the management of diabetic foot for the presence of multiple comorbidity and frail situation with need of conservative and low impact surgical treatment. Aim of the study: to evaluate diabetic complication, foot outcome and walking ability in old diabetic patients compared to a younger population as control group

Method: Interrogation of surgical database between January 2012 and December 2015, founded 1011 surgical treatment on diabetic foot. 99% of patients have type 2 diabetes, mean age was 72±11 years (mean ± SD), 82% were male, a long history of diabetes 18 ± 11 years was founded. We divided population in two group based on age (< or >75years).

Results/Discussion: 445 (44%) patients were over 75 years. This population presented a mean age of 81.6 (range 75-96). Duration of diabetes was longer in elderly (mean 20.2 vs 16.7 years, p<0.001), while metabolic control was similar (HbA1c 7.7% vs 7.8%, p ns). Compared to population under 75 years, old people presented a similar rate of peripheral neuropathy (95% vs 96%, p ns); peripheral arterial disease was prevalent in older people (84% vs 59%, p<0.001) and need to revascularisation too (64% vs 46%, p <0.001). Diabetic foot presentation with acute infection and need to drainage was similar between the two groups (19% vs 18%, p=ns). Surgical outcome: elderly people experienced a more aggressive conservative treatment with higher prevalence of toes (14% vs 10%, p=0.04) and forefoot amputation (10% vs 5.4%, p<0.01). Major amputations were similar between the two groups (2.5% elderly vs 1.4%, p=ns). Walking ability was loss in 28 (6%) elderly patients and 14 (2%) young patients (p=0.002).

Conclusion: Data from this study confirm that elderly patients presented a complications pattern more complex than younger. This pattern justify surgical outcome that is characterized to higher rate of toes and forefoot amputation. No significant difference was found in rate of major amputation. Walking disability is more frequent in elderly underlining the importance of conservative foot surgical approach to limit risk of walking ability loss and permit conservation of functional autonomy.

[O13] THE SPREAD OF FOOT INFECTION AND ITS IMPACT ON THE OUTCOMES OF MAJOR AMPUTATIONS OF LOWER EXTREMITIES IN DIABETIC PATIENTS

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Aim: To assess the spread of foot infection and its impact on the outcomes of major amputations of lower extremities in diabetic patients.

Method: In a multicentre retrospective and prospective cohort study, we included adult diabetic patients (≥ 18 years) who underwent a major amputation of a lower limb in 5 hospitals between 2000 and 2009, 2012 and 2014. A total of 51 patients were included (of which 27 (52.94%) were men and 24 (47.06%) were women) with the mean age of 65.51 years (SD=16.99). Concomitant section's osseous slice biopsy (SOB) and percutaneous bone biopsy of the distal site (BD) were performed during limb amputation. A new surgical set-up and new instruments were used to try and reduce the likelihood of cross-contamination during surgery. A positive culture was defined as the identification of at least 1 species of bacteria not belonging to the skin flora or at least 2 bacteria belonging to the skin flora (CoNS (coagulase negative staphylococci), *Corynebacterium spp*, *Propionibacterium acnes*) with the same antibiotic susceptibility profiles. A doubtful culture was defined as the identification of 1 species of bacteria belonging to the skin flora. The patients were followed-up for 1 year. Stump outcomes were assessed on the delay of complete healing, equipment, need of re-intervention and antibiotics.

Results: In total, 51 SOB were performed during major lower limb amputations (17 above the knee and 34 below the knee) in diabetic patients. Nine (17.65%) bacterial culture results from SOB specimens were positive, 7 (13.73%) doubtful and 35 (68.63%) sterile. Before amputation, 23 patients (45.1%) had not received any antibiotics, including 16 (31.37%) with an antibiotic-free interval of 15 days or more. Microorganisms identified in SOB were also cultured from BD in 33.33% of the cases. Positive SOB was associated with prolonged complete stump healing, re-amputation and the need of antibiotics.

Conclusions: The microorganisms identified from SOB play a role in stump healing in diabetic patients. SOB is useful during major limb amputation due to infectious complications and antibiotic therapy could be corrected on the basis of the SOB culture results.

[O14] DECLINING OFFLOADING RATE IN BELGIAN RECOGNIZED DIABETIC FOOT CLINICS (RDFC): RESULTS FROM AN AUDIT-FEEDBACK QUALITY IMPROVEMENT INITIATIVE.

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Aim: To evaluate how DFU (Diabetic Foot Ulcer) are offloaded in RDFC and the evolution over time. RDFC receive their results after each audit for benchmarking (IQED-Foot project).

Method: Comparison of offloading methods used in 2 audits (2011 and 2013/14). Audits characteristics are described in table 1. In each audit, RDFC registered the first 52 diabetic patients over a 1-year period with a "new" foot problem: DFU of Wagner grade 2 or more and/or active Charcot foot (table 2). Off-loading was categorized as follows: 1. **knee-high device**, removable or not (TCC, Diabetic walkers...), 2 ankle-high **shoe** or cast shoe, 3. **other** off-loading techniques around the ulcer (felt, orthoses). 4. **No off-loading**. In case of multiple means of off-loading, the most elaborate one was selected.

Results/Discussion: Population characteristics in 2013/14 are described in table 3. For plantar ulcers, the overall offloading rate diminished significantly between 2011 and 2013/14, from 84.6% to 76.3% (P=0.01). A non-significant decrease was observed in the use of shoes (42.3 and 34.7% in 2011 and 2013/14 respectively, P>0.05), and no decrease in knee-high off-loading (14.8 and 14.7%) and other off-loading techniques (24.8 and 23.4%). The proportion of non offloaded ulcer increased. For dorsal ulcers, the overall off-loading rates were lower and the decline between 2011 and 2013/14 more pronounced (73.1 and 53.7%, P<0.001), affecting both ankle-high off-loading (31.1 and 21.9%, P=0.02) and other off-loading techniques (30.4 and 19.9%, P=0.02), but not knee-high off-loading (7.0 and 8.1%).

Conclusion: Periodical audits in Belgian Recognized Diabetic Foot Clinics have shown a decline in offloading rates. The percentage of patients without any offloading device is increasing. Audit and feedback including non-public anonymous benchmarking has not been able to prevent this decline. Knowing that offloading is the cornerstone of DFU treatment these results are worrying, although overall off-loading rates were comparable to those reported in Eurodiale. Efforts are needed to understand and tackle the barriers towards a correct application of gold standard offloading techniques.

[O15] CAREFUL SELECTION OF INSOLE MATERIAL STIFFNESS CAN SIGNIFICANTLY IMPROVE PRESSURE REDUCTION IN THERAPEUTIC FOOTWEAR AND ORTHOSES

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Aim: Cushioning materials in therapeutic footwear and orthoses play an important role in the clinical management of diabetic foot by redistributing plantar loads to reduce plantar pressure. However, no set method exists to help clinicians identify the most appropriate cushioning material on a patient specific basis.

This study aims to investigate the effect of cushioning materials' stiffness on their capacity to reduce plantar pressure and quantitatively assess the importance of carefully selected cushioning materials.

Method: Custom flat insoles were produced from nine bespoke polyurethane cushioning materials with qualitatively similar mechanical behavior but different stiffness (from very soft to very stiff). Plantar pressure distribution was recorded during walking for ten healthy volunteers and peak pressure was measured for all materials for the entire area of the foot (overall peak pressure) and for seven individual foot regions. The capacity of each material to reduce pressure was assessed relatively to a practically rigid material. The overall optimum material (i.e. material achieving maximum overall pressure reduction) and region-specific optimum materials were identifies for each participant.

Results/Discussion: One way repeated measures ANOVA indicated that correct selection of cushioning material's stiffness significantly affects pressure reduction (Wilks' Lambda=0.283, $F(2,8)= 10.15$, $p=0.006$). The overall optimum material achieved significant reduction in overall pressure (31±13% reduction, $p<0.0005$) and in region-specific pressure: (a) Heel (26±8% reduction, $p<0.0005$), (b) Hallux (41±14%, $p<0.0005$), (c) 1st MetHead (21±23%, $p<0.0005$), (d) 2nd-3nd MetHead (27±8%, $p<0.0005$), (e) 4th-5th MetHead (23±14%, $p<0.0005$). No significant pressure reduction was achieved by the overall optimum material in the regions of midfoot and toes. On average, the materials minimising pressure for the aforementioned regions were 76% and 21% softer than the overall optimum respectively. Pearson correlation analysis indicated that optimum stiffness is correlated to pressure and the participants' body mass and BMI.

Conclusion: Correct selection of cushioning material's stiffness can significantly improve their capacity to reduce plantar pressure. Different materials might be needed to minimize pressure in different regions of the foot. Subject to validation in people with diabetes, these results set the basis for clinically applicable methods to optimize material selection on a patient specific basis.

[O16] CLINICAL EFFICACY OF THERAPEUTIC FOOTWEAR WITH A RIGID ROCKER SOLE IN THE PREVENTION OF REULCERATION IN PATIENTS WITH DIABETES MELLITUS AND DIABETIC POLINEUROPATHY: A PROSPECTIVE AND RANDOMIZED CLINICAL TRIAL

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Aim: To analyze the efficacy of a rigid rocker sole in the reduction of the recurrence rate of plantar ulcers in diabetic foot patients.

Method: Prospective, randomized and controlled clinical trial(NCT02995863) in patients with diabetic neuropathy which were followed-up during a period for at least one month. Twenty-eight patients were randomized either to use a therapeutic footwear with semi rigid sole (control group) or to use a therapeutic footwear with the same characteristics of shoes of the control group in addition of a rigid rocker sole (experimental group). Patients with Diabetes and history of a recently healed ulcer in the plantar aspect of the foot were included. Patients with active ulcer or those with Charcot foot were excluded. Fifteen patients (53,6%) were randomized to the control group and 13(46,4%) to the experimental group. Monthly visits were made to assess the occurrence of diabetic foot ulcers. The main outcome of this study was the recurrence or reulceration in other location in the plantar foot. A multivariate logistic regression was performed and a model was developed to explain the risk of reulceration. $P<0.05$ was considered to be statistically significant for a confidence interval of 95%.

Results/Discussion: Twenty-seven (96.4%) patients were men, with a mean age of 64,5±8,56 years. All patients had type 2 diabetes with a mean evolution of 13±8,83 years. Nine patients (28,1%) had retinopathy and 3 (9,4%) nephropathy. The mean of body mass index was 26,87±4,89 kg/cm^2. Twelve patients (42,8%) had previous minor amputation. Ten patients (31,3%) had peripheral arterial disease(PAD). The median follow–up time was 126 days [interquartile range (IQR) 50-206] days. During the follow–up, 8 (28,57%) patients in the control group suffered from recurrence ulcer, and 2 (7,14%) patients in the experimental group In the logistic regression, we found statistical differences between the use of a rigid rocker sole in the footwear and footwear without a rocker sole at the time of suffering from a reulceration (p=.010;OR 0.358;[.0164-.779]).

Conclusion: The therapeutic footwear with a rigid rocker sole is better alternative than therapeutic footwear without rigid rocker sole to reduce the risk of reulceration in diabetic patients with polineuropathy and history of diabetic foot ulcer.

[O17] NEUROMECHANICAL DIFFERENCES BETWEEN DIABETIC PATIENTS WITH AND WITHOUT ULCERATED FEET

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Aim: The aim of this study was to investigate the differences in a number of biomechanical, neurological and clinical parameters in patients with and without ulcerated feet along with other demographics and life style profile.

Method: 2406 (M/F: 1379/1027) diabetic patients (184 (M/F: 128/56) with ulcerated vs 2222 (M/F: 1251/971) with non-ulcerated feet who attended the diabetic foot clinic in Tanzania between Jan 2011 and Dec 2015 were recruited and studied.
A combination of categorical and continuous data were collected from the patients during a single visit. A Chi-square test for independence with Yates Continuity Correction was utilized to identify significant ($p<0.05$) association between categorical parameters and diabetic foot ulceration. Furthermore given the non-normal distribution of the data which was established through the test of normality (Kolmogorov-Smirnov, $p< 0.05$), Mann-Whitney U-Test was utilized to assess the significant ($p<0.05$) difference between the patients with and without diabetic foot ulceration.

Results/Discussion: The results demonstrate that the ulcerated group showed a significant ($P<0.05$) association with being male ($\chi^2=11.685$), non-active ($\chi^2=9.856$), and with current/history of smoking ($\chi^2=8.499$), history of alcohol consumption ($\chi^2$26.796), loss of sensation ($\chi^2=57.142$), previous ulceration ($\chi^2=40.502$), foot deformity ($\chi^2=30.108$) and nail ingrowth ($\chi^2=10.672$).

Whilst significant ($P<0.05$) association was found between ulceration and the history of amputation ($\chi^2=116.485$) with a medium effect size. Moreover the touch sense sensitivity ($\chi^2=164.200$) and swelling ($\chi^2=589.781$) both with a large effect size were significantly associated with ulcerated group.

In addition higher VPT ($U=92344.5$); lower cool sensitivity ($U=81828.5$); higher heat sensitivity ($U=103680.5$); lower cold pain threshold ($U=99477.0$) and higher heat pain threshold ($U=91143.0$) were the other significant ($P<0.05$) characteristics of the patients with ulcerated foot when compared to the non-ulcerated group.

Furthermore, the plantar pressure during walking was significantly ($P<0.05$) higher at the 1st and 5th Metatarsal head, while showed to be lower under the toe regions and the medical and lateral hind foot for patients with ulcerated foot compared to the non-ulcerated group .

Conclusion: The results of this study indicates that the ulcerated group show significant differences in a number of neuromechanical parameters against their non-ulcerated counterparts. These findings can have implications in designing a specific intervention in treating ulcerated patients.

[O18] CAN PEOPLE WITH DIABETES REDUCE THE MUSCULAR DEMANDS OF WALKING THROUGH ALTERING THE LEVERAGE AT THE ANKLE?

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Aim: This study aimed to investigate the ratio of the internal compared to the external leverage around the ankle during walking, known as the effective mechanical advantage (EMA) and examine how alterations to the EMA with diabetes and diabetic neuropathy might serve as a mechanism to reduce the workload for the ankle plantarflexor muscles.

Method: Thirty one non-diabetic controls (Ctrl); 22 diabetes patients without peripheral neuropathy (DM) and 14 patients with moderate/severe diabetic peripheral neuropathy (DPN) underwent gait analysis using a motion analysis system and force plates. The internal Achilles tendon moment arm length was determined using magnetic resonance imaging during weight-bearing and external moment arm (ExtMA) was calculated using gait analysis. The EMA around the ankle is given by the ratio of the internal to the ExtMA, with lower values reflecting a relatively greater contribution from the ankle plantarflexor muscles towards the joint moment required to overcome the external resistance during walking.

Results/Discussion: A greater value ($P<0.01$) for the EMA at the ankle was found in the DPN (0.488) and DM (0.46) groups compared to Ctrl (0.448). The increased EMA was mainly caused by a smaller ExtMA in the DPN (9.63 cm; $P<0.01$) and DM (10.31 cm) groups compared to Ctrl (10.42 cm). This increased ExtMA may in turn result from the ground reaction force being applied more proximally on the foot, or at an angle directed more towards the ankle. These findings indicate that the ankle plantarflexor muscles would need to generate lower forces to overcome the external resistance during walking compared to controls.

Conclusion: Our findings uncover a new mechanism through which patients with diabetes and particularly those with DPN manage to reduce the joint moment (i.e., strength produced) at the ankle during walking by altering the ratio of the internal to external leverage (the EMA) around the ankle. This strategy allows patients with diabetes and particularly those with DPN to reduce the muscular demands of walking in light of their lower physical capabilities compared to controls.

[O19] DIGITAL DEFORMITIES ASSESSMENT SHOULD BE CONSIDER BEFORE A PERCUTANEOUS FLEXOR TENOTOMY FOR MANAGEMENT DIABETIC FOOT ULCERS ON THE TOES

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Aim:

1. To evaluate the proportion of digital deformities according to McGlamery's classification in patients with diabetes *mellitus*.
2. To assess the relationship between dynamic deformities described by McGlamery and the risk of digital ulcer.

Method: Prospective study was performed in Diabetic Foot Unit between September 2016 and March 2017. Sixty/three consecutives patients with diabetes (126 feet) were evaluated. One clinician performed all the exams of the foot to identify the deformities which were classified in claw or hammer-toe, and in rigid or flexible deformities. Previous ulceration were analyzed and impending ulceration were evaluated by calluses on the tip, over the dorsum of the claw or hammer-toe or nail dystrophy. A film clip in slow motion of the patient´s gait was obtained to evaluate the dynamic deformities during the gait and two clinicians categorized independently the deformities described by McGlamery: flexor stabilization, flexor substitution, extensor substitution.

Results: 124 feet (63 patients) were analyzed. 15 feet (12.1%) did not show digital deformities, 2 feet (1.6%) had hammer toe and 107 (86.3%) claw toe. 49 feet (39.5%) suffered rigid deformities, 38 feet (30.6%) had callosity in the tip of the toe, 35 (28.2%) in the dorsum, and 60 (48.4) nail dystrophy. McGlamery classification showed a good intraobserver reliability[0.701($p<0.001$)]. Callus on the tip toe and previous ulceration were associated with flexor stabilization (p=.012;IC[1.237-6.067];OR 2.7) and with dynamic deformities(p=.024; IC[1.124-8.161];OR 3.029) respectively. When the flexible deformities were evaluated (n=60 feet), we obtained 16 feet with history of previous ulceration, 8 of them had flexor stabilization, 1 had flexor substitution, and 3 had extensor substitution. Extensor substitution was associated with calluses over the dorsum of the toes (p=.019;IC[1.202-13.875];OR 4.083), nail dystrophy was associated with dynamic deformities (p=.010;IC[1.322-9.938];OR 3.625), and flexor stabilization was associated with previous ulcer (p=.041;IC[1.019-10.141];OR 3.214).

Conclusion: Flexor stabilization was the most dynamic deformity associated with previous ulcer. However, extensor substitution was present in close to 20% of the patients with previous ulcer in whom that flexor tenotomy could aggravate digital deformity. Although there was a high prevalence of flexor mechanism related to ulcers risk, an evaluation of dynamic deformities during the gait should be included as a pre-surgical assessment.

[O20] ANALYSIS OF THE FOOT'S MORPHO-FUNCTIONAL CHARACTERISTICS THAT CAN PREDISPOSE IN THE DEVELOPMENT OF A CHARCOT'S DIABETIC- NEUROPATHIC-OSTEO-ARTHROPATHY (DNOA)

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Aim: To define the morpho-functional characteristics that influence as risks factors in Charcot´s Neuropathic Osteo-Arthropathy patients with Diabetes mellitus (DM).

Method: A prospective study enrolled consecutively patients with diabetes from December 2013 to December 2015. Inclusion criteria were at least three of the following risk factors related Charcot foot (CF): male, duration of DM greater than 10 years, Body mass index (BMI) greater than 30, alcohol abuse, advanced kidney disease, arterial calcification and poor metabolic control. Neurological, vascular and morpho-functional assessment were recorded. X-ray and blood tests were performed at 6, 12 and 24 months. At the end of the study any CF and its relationship with the variables studied was evaluated.

Results/Discussion: 28 patients were included, with a mean age of 60±8.3 years. 26 had DM2 with a mean duration of 14.59 ± 11.93 years. 11 (39.3%) had retinopathy and 4 (14.8%) nephropathy. BMI mean was 29.19 ± 4.5 kg/cm^2. 32 (57.1%) had pronated or highly pronated foot according to the Foot Posture Index. We found association between pronate foot and the following radiological findings: Lisfranc subluxation (0.000; OR: 17.3[4.4-68]), joint subluxations between 2nd metatarsal and 2nd cuneiform (0.048; OR: 7[0.7-61]), joint subluxation between 2nd metatarsal and 1st cuneiform (0.000; OR:9.5[2.6-34]), bone reabsorption in midfoot (0.04; OR:8.5[0.8-83]), and articular midfoot collapse (0.035; OR:3.3[1-10.7]). Intermetatarsal angle between 1st and 2nd (p=0.002), divergence talus/calcaneus angle (p=0.023) and talus inclination angle (p=0.008) were increased during follow-up. During follow-up: one patient developed a CF, 2 developed a stress fracture in the 4th metatarsal and another one developed bone resorption and periostic reaction in midfoot. Procollagen type 1 n-terminal propeptide (p=0.042) and bone alkaline phosphatase (p=0.05) was increased and had statistically association with the patients with radiographic changes.

Conclusion: Pronate foot is the most prevalent foot type in a cohort of patients with risk factors to develop CF. Pronate foot showed radiological findings similar to those found in chronic CF. The premature alteration in some analytical variables were observed in the patients that showed radiographic changes during the follow-up compatible with CF.

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[O21] BONE IMMUNOHISTOCHEMISTRY AND LEVELS OF RANKL, OSTEOPROTEGERIN AND INFLAMMATORY CYTOKINES IN ACUTE CHARCOT FOOT

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Charcot neuroarthropathy (CN) is a progressive condition affecting the bones and joints of the foot and is characterized by pathologic fractures, joint dislocations and debilitating deformities. An exaggerated inflammatory response to a minor trauma is the most current theory regarding the pathophysiology of CN, but the pathogenesis remains unclear. Osteolysis mediated through inflammation and activation of the receptor activator of nuclear factor kappa B ligand (RANKL)-osteoprotegerin (OPG) pathway has been proposed to be the primary event for the initiation and progression of CN.

The aim of this study is to determine the role of the RANKL-OPG pathway, as well as the role of pro-inflammatory cytokines and calcitonin gene-related peptide (CGRP) in bone destruction in acute CN.

A total of 58 subjects have been included in the study, 23 individuals with acute CN, 15 patients with diabetes and peripheral neuropathy, 11 patients with diabetes without peripheral neuropathy and 14 healthy individuals. Eleven participants with acute CN, 10 participants with diabetes and peripheral neuropathy, 8 participants with diabetes without peripheral neuropathy and all healthy individuals have undergone bone biopsies from the foot during elective correcting or other surgery. The excised bone has been fixed in formaldehyde, decalcified in a mixture of formaldehyde and formic acid before routine paraffin-embedded sectioning and staining with hematoxylin and eosin. Immunohistochemistry for the examination of RANKL, OPG, TNFa will be performed at the end of the study. Blood samples have been drawn and determination of RANKL has been performed with ELISA immunoassay, while determination of OPG, TNFa, IL-1b, IL-6, bone specific alkaline phosphatase and CGRP will be performed at the end of the study.

To our knowledge, this is the first study to look for potential differences among expression of RANKL and OPG in bone specimens obtained from the affected sites of patients with acute CN, diabetic patients with and without peripheral neuropathy and healthy individuals. New insights in the pathogenesis of CN could lead to the adoption of new therapies that antagonize the pathologic mechanisms.

[O22] FOOT STRUCTURAL CHANGES AFTER LATERAL COLUMN EXOSTECTOMY IN PATIENTS WITH CHARCOT FOOT

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Aim: To evaluate the changes in the radiographic alignment after an exostectomy in patients with Charcot foot (rocker bottom) and plantar ulcer located in the lateral column.

Method: A retrospective study between January and February 2017, evaluated 9 patients with diabetes underwent exostectomy for treating a non-healing plantar ulcer located in the lateral aspect of the foot. Foot alignment was assessed by following angles in weight-bearing lateral radiographic view: calcaneal pitch angle; talus inclination angle; first metatarsal inclination angle, Meary's angle; calcaneal-first metatarsal angle; and talus-calcaneal angle. These angles were calculated in both preoperative and postoperative radiographic view to assess changes in the foot alignment after exostectomy. Two different clinicians were blinded to calculate the angles in preoperative and postoperative radiographic views. The reliability in the angles was assessed using intraclass correlation coefficients (ICCs) and the differences between preoperative and postoperative measurements were calculated by paired sample t-student. P<0.05 was considered to be statistically significant for a confidence interval of 95%.

Results/Discussion: Evaluated angles demonstrated excellent inter-rater reliability with ICCs ranging from 0.91 to 0.99. Greater inclination in the talus and calcaneal were observed after exostectomy (table1). Furthermore, those patients (n=7) which cuboid bone or calcaneal-cuboid joint were involved in the exostectomy showed greater changes in the calcaneal pitch angle (p=. 020 [3.055-24.831]).

N=9	**Pre-operative**		**Postoperative**		**P-value**
	ICC [95%CI]	Mean ±SD	ICC [95%CI]	Mean ±SD	**CI [95%]**
Calcaneal pitch angle	.975* [.870-.994]	2.20º±9.81	.992* [.963-.998]	-8.64º±10.31	.026* [1.694-19.995]
Talus inclination angle	.958* [.816-.991]	39.53º±7.51	.974* [.884-.994]	46.24º±9.07	.032* [-12.661--.761]
First metatarsal inclination angle.	.917* [.633-.981]	16.49º±6.52	.994* [.974-.999]	16.82º±9.36	.864 [-4.529-3.884]
Meary's angle	.959* [.810-.991]	156.86º±11.14	.964* [.841-.992]	150.87º±8.64	.028* [.840-11.127]
Calcaneal-first metatarsal angle	.946* [.755-.988]	164.56º±11.75	.995* [.977-.999]	170.02º±13.26	.130 [-12.927-1.993]

Talus-calcaneal angle	.983* [.930-.996]	36.96º±10.19	.984* [.931-.996]	37.03º±9.75	.971 [-4.134-4.001]

Conclusion: Lateral column exostectomy cause worsening of the arch collapse in patients with Charcot foot. Misalignment in talus and calcaneal bones was commonly associated after an exostectomy in patients with Charcot foot and plantar ulcer located in the lateral column. The risk to develop foot unstable was increased in those exostectomies that involve calcaneal-cuboid joint.

[O23] TEMPERATURE DIFFERENCE LESS THAN 2 DEGREES COMPARED WITH THE CONTRALATERAL FOOT DOES NOT RULE ACTIVE CHARCOT OSTEOARTHOPATHY: IMAGING IS MANDATORY

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Aim: The active Charcot foot is diagnosed when it is at least 2°C warmer compared with the contralateral foot. However, we report that only 28% of patients diagnosed with Charcot osteoarthropathy by X-ray or magnetic resonance imaging (MRI) present with skin foot temperature difference 2°C or greater compared with the contralateral foot.

Method: We studied 36 patients (20 males and 16 females) who presented with intact hot swollen unilateral foot and clinical suspicion of active Charcot foot in our Diabetic foot Clinic over an 18-month period. Skin foot temperatures were measured with infrared thermometer at corresponding sites of the right foot and left foot. These included metatarso-phalangeal joints, tarso-metatarsal joints, medial and lateral malleoli. Patients underwent weight-bearing foot and ankle radiographs and in cases of normal x-rays, magnetic resonance imaging (MRI) or single-photon emission computer tomography (SPECT/CT) was performed.

Results/Discussion: In 21 patients the diagnosis of Charcot osteoarthropathy was made by the presence of typical radiological changes on weight-bearing foot and ankle radiographs (stage 1 Charcot foot). Fifteen patients presented normal X-rays (stage 0 Charcot foot) but 12 patients had abnormal MRI scans and 3 patients had abnormal SPECT CT scans.

The maximum skin foot temperature difference between feet was above 2°C only in 2/15 patients with stage 0 Charcot foot and in 8/21 patients with stage 1 Charcot foot. The median temperature difference was 0.9°C [0.6-1.7°C] in stage 0 Charcot foot and 1.9°C [0.7-2.4°C] in stage 1 Charcot foot. There was no correlation between the maximum temperature difference between feet and the presence of radiological changes ($r=0.277$, $p=0.102$).

Conclusion: This study reports that only 13% of patients diagnosed with a stage 0 Charcot foot (x-ray negative stage, MRI positive) and 38% of patients diagnosed with a stage 1 Charcot foot (X-ray positive) have a temperature difference 2°C or greater compared with the contralateral foot. We recommend that in a patient with a clinically suspected Charcot foot, it is imperative to carry out imaging studies to identify early bone damage even in cases presenting with a temperature difference below 2°C.

[O24] TOTAL CONTACT CASTING IS A SAFE TREATMENT MODALITY FOR ACUTE CHARCOT OSTEOARTHROPATHY AND NEUROPATHIC ULCERATION AND IS NOT ASSOCIATED WITH INCREASED INCIDENCE OF DEEP VEIN THROMBOSIS

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Aim: Total contact casting is an established 'gold standard' treatment for managing acute Charcot osteoarthropathy and offloading neuropathic ulceration. There are currently no definite guidelines for using anticoagulation therapy with a cast.

The aim of this study was to analyse the incidence of deep vein thrombosis (DVT) in patients treated with total contact casting in our Diabetic Foot Clinic, where it is not a standard practice for patients to receive prophylactic anticoagulation therapy.

We report that out of 879 casting episodes, over a 12 month period, and with an 18-month follow up there were no cases of DVT.

Method: We analysed a total of 879 episodes of cast treatment in 184 patients (43 female, 141 male). These patients presented to our Diabetic Foot Clinic with neuropathic foot ulceration or Charcot osteoarthropathy over a 12 month period. The casting episodes which were analysed included only treatment with a non-removable total contact cast.

Results/Discussion: All patients were treated with standard casting therapy and did not receive prophylactic anticoagulation therapy for total contact casting. At each visit the patients were routinely assessed for any clinical signs of DVT. Of the 184 patients, 26 required DVT scans but no patients were diagnosed with a DVT during the study.

Conclusion: This study has shown that total contact casting is a safe treatment for Charcot osteoarthropathy and neuropathic ulcers. This therapy was not complicated by DVT in 100% of patients.

[O25] ADHERENCE TO GUIDELINE-RECOMMENDED MEDICAL THERAPIES IN TYPE 2 DIABETIC PATIENTS WITH CHRONIC CRITICAL LIMB ISCHEMIA

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Aim: The aim of this study was to evaluate the adherence to guideline-recommended medical therapies in type 2 diabetic patients managed by a third-level Center for chronic critical limb ischemia from January 2011 to December 2015.

Methods: We analyzed the database of 603 type 2 diabetic patients (M/F: 430/173; age: 72±9 yrs; diabetes duration: 20±12 yrs; BMI: 27.6±4.9 Kg/m^2; HbA1c 7.9±1.6%), focusing on the use of statin, anti-hypertensive and antiplatelet drugs, and smoke habits at the admission.

Results: In total, 63.7% of patients were on statin therapy; 82.6 % on anti-hypertensive treatment and 70.7% on antiplatelet drugs. Concerning smoke habits, 19% of patients were no-smokers; 41% former smokers and 40% active smokers. Among all patients, 32% were prescribed all the four guideline-recommended therapies. We observed no differences in total (138.8±42.2 vs 138.2±42.5 p=NS) and LDL cholesterol levels (75.0±35.4 vs 76.6±28.7 p=NS) in patients on Statin therapy when compared with patients without hypolipidemic drugs. In patients treated with anti-hypertensive drugs we observed higher levels of systolic pressure (138.0±29.5 vs 107.7±36.6 p<0.02) while no differences were observed in diastolic pressure levels.

Conclusion: In conclusion, in diabetic patients with a severe limb and life threatening clinical condition, we observed a weak application of international guideline-recommended medical therapies. In fact, not only just one out of three patients were on recommended medical treatment, but also these patients did not reach the standard targets requested to prevent cardiovascular disease.

[O26] GLYCAEMIC VARIABILITY AS MEASURED BY THE MAGNITUDE OF VISIT TO VISIT HBA1C CONCENTRATIONS OVER THE 5 YEARS PRIOR TO PRESENTATION IS SIGNIFICANTLY ASSOCIATED WITH RATE OF WOUND HEALING IN THE DIABETIC FOOT

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Aim: Recent work has suggested that glycaemic variability – the visit-to-visit variation in HbA1c – plays a role in the development of micro and macrovascular disease in patients with diabetes. However, whether glycaemic variability is a factor determining wound healing in diabetes related foot ulcers remains unknown. We aimed to see whether this was the case.

Method: A retrospective analysis of patients attending our specialist multidisciplinary diabetes foot clinic between July 2013 and March 2015. Patients were only included if they had at least 3 HbA1c measurements 5 years prior first presentation with a foot ulcer and who had more than 2 follow-up appointments up to 1 year of first presentation. HbA1c variation was measured by the magnitude of Standard Deviation (SD) of HbA1c.

Results/Discussion: 629 foot ulcers were referred to the clinic between July 2013 and March 2015. 328 cases were excluded. Of the remaining 302, 181 patients had their number of days to healing recorded. The overall geometric mean days to heal was 91.1 days (SD 80.8 to 102.7). In the low HbA1c variability group the geometric mean days to heal was 72.1 days (58.3 to 89.1) and in the high Hb1Ac variability group the geometric mean days to heal was 106.5 days (89.4 to 126.9), ($p<0.05$).

In addition, ulcer healing was significantly associated with duration of DM ($p=0.0278$). The odds of healing for DM duration of 8-15 years was 2.56 (95 CI 1.25 to 5.139) compared with having DM <8 years. Ulcer grade [Texas] ($p<0.0001$), number of pulses ($p<0.0001$), ABPI ($p=0.0208$) and past foot problems ($p=0.0453$) were also statistically significantly associated with ulcer healing. Type 2 patients on tablet or insulin odds of healing 2.6 (95% CI: 1.37 to 4.94) times that of patients with Type 1 DM or diet controlled T2DM.

Conclusion: Our novel data has shown that wound healing of a foot ulcer is significantly associated with HbA1c variability, with lower variability associated with shorter time to heal. These data confirm the importance of maintaining steady glycaemic control, but also emphasise that large variations in HbA1c over time lead to longer healing times.

[O27] DIABETIC FOOT ULCER RECURRENCE PREDICTION: A TIME-TO-EVENT ANALYSIS

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Aim: The focus of preventive measures should be, firstly, high risk patients. However, there is an insufficient number of studies addressing the diabetic foot ulcer (DFU) recurrence (R) risk and how to predict its occurrence. So, we aim to identify the variables linked with DFU-R.

Method: We consecutively included all subjects with an active DFU treated in our Hospital Diabetic Foot Clinic, from 01/2011 to 03/2013, which healed. At baseline, demographic and clinical information was collected. After complete healing or lower extremity amputation (LEA), patients were followed for 3 years, until DFU-R or death by consulting the clinical files and National Data Platform. A model was derived to predict DFU recurrence by using first a univariate and then a multivariate Cox regression analysis, considering time to event. Hazard ratios (HR) and respective 95% confidence intervals (CI) were calculated.

Results/Discussion: The sample (n=172) mean age was 68 (±11) years and of Diabetes (DM) duration 19 (±11) years; 64% were male, all had type 2 DM, 63% had physical impairment and DM related complications prevalence ranged from 15% (coronary heart disease) to 54% (retinopathy). With a median follow-up of 24 (0-36) months, 42% had DFU-R (from which 74% were digital and 19% required a LEA) and 23% died before DFU-R. Median time to DFU-R was 12 months. In our univariate analysis, subjects with coronary heart disease (CHD), end-stage renal disease, in whom the previous DFU was located at the forefoot, affected the bone and had longer duration (in months) had a DFU-R more rapidly. In the multivariate analysis only CHD (adjusted HR 3.16, 95% CI 1.21-8.25), previous DFU located at the forefoot (adjusted HR 3.69, 95% CI 1.05-12.98) and previous DFU duration (adjusted HR 1.13, 95% CI 1.03-1.24) maintained statistical significance.

Conclusion: Our data points out that special attention and foot care should be given to subjects with CHD in whom their previous DFU occurred in the forefoot and had longer duration. On the other hand, it also indicates that prevention of digital DFU-R is of fundamental importance.

[O28] INCIDENCE AND PREDICTORS OF RECURRENT AND NEW DIABETIC FOOT ULCERS

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Aim: 1) among patients with a healed DFU to estimate the progression rate to recurrent/new diabetic DFU, 2) to compare the progression rates depending on whether the healed ulcer was neuropathic, neuro-ischemic or ischemic, and 3) to study selected risk factors rate ratios (RR) for progression to recurrent/new DFU.

Method: A retrospective cohort study including all patients with a healed diabetic foot ulcer at our centre from 2010 to 2016. Patients were followed to an outcome (a recurrent/new DFU), to end of contacts with our centre, to death or to study end. Poisson regression analyses were made.

Results/Discussion: Among 780 patients with a healed DFU, (489 (63%) neuropathic, 202 (26%) neuro-ischemic and 89 (11%) ischemic), 53% (33%/person year) progressed to a recurrent/new DFU during follow-up. The patients were followed for 1249 years in total (median 1.04 (Q1= 0.38 – Q3=2.46) years pr. patient).

When adjusted for age and gender, the RR for neuro-ischemic vs. neuropathic was 1.29 (95% confidence interval (CI) 1.03-1.61) and ischemic vs. neuropathic was 1.42 (95% CI 1.04-1.95). A quarter of the patients (26%) died during follow-up. A majority of the DFU seen during follow-up were new (88 %).

Men – RR 1.26 (95% CI 1.01-1.56), patients with lost sense of vibration (> 50 Volt) – RR 1.31 (95% CI 1.08-1.59), patients with Charcot feet – RR 1.66 (95% CI 1.20-2.28) and patients with foot deformities – RR 1.26 (95% CI1.00-1.59) had higher progression rates to recurrent/new DFU compared to patients without these risk factors. Patients with type 1 diabetes – RR 0.81 (95% CI 1.01-1.56), non-smokers – RR 0.76 (95% CI 0.63-0.93) and patients with a creatinine level < 90 μmol/l – RR 0.76 (95% CI 0.63-0.93) had lower risk of progression to a recurrent/new DFU compared to patients without these characteristics.

Conclusion: Per year one third of the patients progressed to a recurrent/new DFU which is comparable to other studies. Patients with a neuro-ischemic or ischemic DFU progressed to recurrent/new DFU at a higher rate than patients with neuropathic DFUs. Male gender, type 2 diabetes, smoking, lost sense of vibration, Charcot feet and foot deformities were risk factors for recurrent/new DFU.

[O29] DOES THE TIME INTERVAL BETWEEN PODIATRIC REVIEW AND INTERVENTION INFUENCE RECURRENCE OF DIABETES FOOT ULCERS?

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Aim: Primary aim: Determine whether or not the frequency of podiatric interventions prevents the recurrence of diabetic foot ulceration (DFU).

Secondary aim: If re-ulceration did occur was time to re-ulceration affected by the time review frequency.

Method: A randomised control trial of parallel design with three treatment interval groups was conducted. Patients with a healed ulcer of ≤ 2 weeks were allocated to one of three groups (Two, four or eight weeks). Participation was for one year unless another episode of re-ulceration occurred and they were withdrawn. There were also health quality of life questionnaires (EQ-5D 3l) completed at point of entry and those at re-ulceration. All participants with Diabetes Type 1 and 2 were considered for inclusion.

Results/Discussion: Primary results: Frequency of podiatric care did not prevent recurrent of DFU. Out of 103 participants, 71 (70%) re-ulcerated. There were no statistical differences between the three groups (p=0.41). Over the study period, 16 remained ulcer free (p=0.33) and 15 (14%) voluntarily withdrew/left the study.

The median days to re-ulceration were; Group 1-two week treatment interval-65.5 days, Group 2- four week treatment interval-71.5 days, Group 3- eight week treatment interval- 84 days. This was not statistically significant (p=0.22).

Using the EQ-5D 3l 'Visual Analogue Scales', the participants that re-ulcerated also showed a significant reduction in overall health rating than those that remained intact (65 ± 19.0 pre-study and 58.9 ± 19.7 after re-ulceration).

Conclusion: The purpose of this study was not test podiatry intervention as this has been well documented. A history of DFU is recognised as the highest risk factor for ulceration and podiatry care is essential in preventing recurrence. However, this is the first study conducted that measures the impact of frequency of appointment interval. The results are clear that recurrence is extremely high in this group and the frequency between appointments does not influence rates or time to re-ulceration. This indicates that frequency of appointments may be safely extended. However, the numerical difference in 'time to re-ulceration' in the eight week group was numerically longer and this highlights that timely access to podiatrists is essential.

[O30] INFRAINGUINAL REVASCULARIZATION IN DIABETIC PATIENTS IN HEMODIALYSIS. WHAT HAS CHANGED?

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Aim: The treatment of critical limb ischaemia (CLI) in diabetic patients represents one of the most challenging goals to Vascular Surgeons. In diabetics with chronicle kidney disease in hemodialysis (stage5 CKD), the atherosclerotic process is associated with even more severe and diffuse arterial calcification, which leads to a worse prognosis. We describe our institution results in the treatment of CLI in these patients.

Method: It was done a retrospective analysis of all the diabetic patients with stage 5 CKD, revascularized between 2009 and 2014. The primary outcome was the limb salvage rate. Secondary outcomes were the freedom from target lesion revascularization (TLR) and the patency in the patients submitted to revascularization by conventional surgery. A comparative analysis between our results and the results published by our institution in a previous period (2006 to 2008) was done.

Results: A total of 45 limbs of diabetics in stage 5 CKD were revascularized in the analysis period. The studied sample was similar to the previous study. The 12 month survival was 68,2%. The limb salvage rate at 6m and 12m were 83.5% and 74.4%; superior, but without statistical significance (p=0747), to the previous study (63.3% at 12m). The TLR at 6m was 64,1%, inferior to the previous study (86.6%). In the group of patients submitted to conventional surgery, the patencys at 3,6 and 12 months were 71.4%, 64.9% and 51.9%. It was verified between the periods of analysis an increase of the number of treated limbs/year, of the revascularizations or TLR/year (12.2 vs 6.33) and of the revascularizations or TLR for each treated limb (1.55 vs 1.19). There was an increased number of endovascular interventions/year (6.5 vs 3.33) but also of conventional surgery (4.67 vs 2.67).

Conclusion: The mortality and major amputation rate remain high in diabetics with stage 5 CKD. In our institution, between the studied periods, was verified an increase of the rate of revascularized limbs and interventions of revascularization. This was due to the increase of the endovascular procedures, but also of the conventional surgery that maintains an essential role in this patients with extensive calcified and arterial occlusions.

[O31] ALTERATION OF SKIN BLOOD FLOW IN RESPONSE TO LOCALLY APPLIED PRESSURE IN TYPE 2 DIABETIC PATIENTS WITH FOOT ULCER

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Aim: We previously described a specific cutaneous skin blood flow in response to an increase non-noxious progressive local pressure. This neurovascular reactivity permits an increase local blood flow that contribute to limit skin ischemia and by the way ulceration. This neurovascular response is impaired in patients with type 1 and type 2 diabetes but no data were available in patients with diabetic foot ulcer (DFU). We analysed, in this study, skin blood flow response of locally applied pressure in patients with DFU and in patients without DFU.

Method: Patients were recruited in a single diabetic centre. All patients had a complete record of diabetes history and foot problem. Neuropathy was assessed using the neuropathy sensitivity score (NSS), the neuropathy disability score (NDS) and by sensory tests. Basal blood flow, endothelium-dependent and endothelium-independent vasodilatations, maximal vasodilatation capacity by local heating to 44°C and skin blood flow in response to locally applied pressure were measured. All measurement were realised on the same tibia. Vasodilatory responses were expressed as the maximal percent increase in cutaneous blood flow from the baseline.

Results/Discussion: A total of 59 patients with type 2 diabetes were included; 29 without DFU and 30 with DFU. Patients were predominantly men (78%) with a mean age of 65 ± 11 years. Patients with DFU have a significant higher NDS score (6.0 ± 0.5 vs 2.8 ± 0.6, $p<0,05$) than those without DFU. There is a significant lower increased skin blood flow in response to locally applied pressure in the group with DFU than in the group without DFU (36% ± 8 vs 81% ± 28, $p<0,05$). There is no difference between the two groups in term of age, NSS, warm perception threshold, cutaneous pressure perception threshold, endothelium-dependent and endothelium-independent vasodilation and skin blood flow in response to local heating.

Conclusion: This study revealed that increase blood flow in response to non-oxious pressure locally applied is significantly more impaired in patients with DFU than in those without DFU underlining a reduce ability of the skin to be protected against local pressure and ischemia.

[O32] THERMOGRAPHIC IMAGING FOR DETECTION OF PERIPHERAL ARTERIAL DISEASE: A COMPARATIVE STUDY

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Aim: To investigate whether participants living with peripheral arterial disease (PAD) would exhibit a significant difference in thermal image characteristics when compared to subjects living with diabetes mellitus (DM) without complications.

Method: Participants living with type 2 diabetes underwent thermographic imaging in a room at 23^{o}C, whilst lying in a supine position and with a thermal camera* placed 1.5m away from the feet. Once acclimatized to room temperature, thermal images of the palms and feet were taken. Thereafter, subjects were categorized into two groups. Those subjects who had triphasic waveforms and an ABPI >0.9–1.2 were classified in the DM group, whilst those with an ABPI <0.6 and monophasic waveforms were categorized in the PAD group. Automatic segmentation of the toes, medial, central and lateral forefeet and palms was performed using custom software, which extracted mean, maximum and minimum temperatures.

Results/Discussion: Out of 223 participants (430 limbs) who were initially tested and imaged, 62 limbs (from 11 females, mean age 64.5 yrs; 51 males, mean age 72.2yrs) were categorized as PAD and 22 limbs (from 9 females (mean age 59.8, 13 males, mean age 65.8yrs) as subjects with DM. Independent sample T-Test demonstrated a significant difference between all the toes of the two groups (p=0.005, p=0.033, p=0.015, p=0.038 and p=0.02 for toes 1-5 respectively). A Palmar/Plantar Thermographic Index composed of the $mean_{Max}$PalmTemp/$mean_{Min}$ForefootTemp also revealed significant difference between the two groups (p=.016). Mean Forefoot Temperature in PAD vs Subjects with DM was also significant (p=.019), however with the PAD group having a higher mean temperature (28.3^{o}C) when compared to the subjects in the DM Group (26.2^{o}C).

Conclusion: Thermography may have potential as a method of detecting peripheral arterial disease in the feet. The unexpected higher mean temperatures in participants with PAD when compared to the DM participants could be attributed to alternate collateral route taken by the circulating blood due to occluded arteries which may be closer to the periphery, thus increasing heat emissivity. Nonetheless, the application of thermography is still unclear and further research in this field is warranted.

* FLIR Model SC 7000

[O33] SHOULD CALCANEAL ULCERS BE MANAGED IN A CLASS OF THEIR OWN?

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Aim: Calcaneal diabetic foot ulcers are experientially the most challenging to manage. The aim of this enquiry is to interrogate the specific clinical features of diabetic calcaneal ulceration and spark debate as to whether it should be managed differently from the outset.

Method: Clinical, laboratory and radiological data were collected for 34 calcaneal ulcers cases in our diabetic foot service (March 2010 to November 2016). Outcomes of interest included mortality rates, average healing time, and major limb amputation. Data collection for an age-matched control group with non-calcaneal foot disease is in progress.

Results/Discussion: The average age of our calcaneal cohort was 65 years and the mean diabetes mellitus duration was 25 years (which does not differ significantly from our overall diabetic foot disease population). The mortality rate in the calcaneal cohort was strikingly high at 43% (12/28) compared with 11% in previously published data for all patients with diabetic foot ulcers in our unit over the same 6-year time period. In 6 of the patients who died, the calcaneal ulcer was still an active problem at the time of death, with a mean preceding duration of 30 months.

Only 1 calcaneal ulcer healed by 24 weeks. 10 ulcer episodes took longer than 24 weeks, with an average healing time of 15 months. By comparison, National Foot Audit data reports that 49% of all diabetic foot ulcers can be expected to heal by 12 weeks. A below knee amputation (BKA) was required in 21% (7/34) of calcaneal ulcer episodes. 2 episodes requiring BKA were due to chronic ulceration lasting a mean duration of 51 months. Compared with our non-calcaneal ulcer population, heel ulcers are more significantly associated with PVD ($P<0.01$).

Conclusion: Diabetic calcaneal ulcers are associated with poor healing rates, higher rates of amputation, and a 5-year mortality rate of close to 50%. We plan to interrogate predictors of healing in calcaneal diabetic foot disease. The diabetes foot community should consider revising current treatment guidelines for calcaneal disease, considering earlier, more aggressive interventions to prevent chronic and potentially life threatening longer-term sequelae.

[O34] HOSPITALISED INDIVIDUALS WITH DIABETIC FOOT DISEASE HAVE HIGH PREVALENCE OF COGNITIVE AND PSYCHIATRIC COMORBIDITIES WHICH ARE ASSOCIATED WITH POOR CLINCIAL OUTCOMES

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Aim: The high prevalence and adverse clinical outcomes of depression in diabetic foot disease (DFD) are well recognised. However, the prevalence and impact of significant cognitive and non-depressive psychiatric comorbidities (C/NDPC) in DFD has not been well documented. We aimed to explore this in a specific cohort of those admitted to hospital for the management of DFD.

Method: Analysis of 135 individuals, prospectively collated over 11 months, hospitalised with DFD at a single centre. C/NDPC was considered present if there was a pre-existing of a cognitive or an ICD-10 Classification of Mental and Behavioural Disorder/s apart from depression (F32-38), or if a new diagnosis was made during the admission. Differences in characteristics between participants were tested using unpaired t -test and odds ratio calculated where necessary.

Results/Discussion: The group was predominately male (76%), with an average age of 62±13years and HbA1c of 8.8±3.4% and 55% had evidence of significant peripheral vascular disease. Overall, 38 % (48/136) had C/NDPC of which 29% (14/48) had dementia. Schizophrenia (23%), Anxiety disorder (20%), personality disorder (10%), bipolar disorder (8%) were other important psychiatric comorbidities. Those with C/NDPC were younger (59±11 years v 62±16 years (p=0.08), had higher HbA1C 9.3% v 8.2% (p=0.03) and showed a trend towards presenting more often through the emergency department (54% v 40%, p=0.12). There were 4 major amputations in the C/NDPC group, while there were none in those without. Not unsurprisingly, those with C/NDPC had a longer length of hospital stay (48±59 v 33±12 days, p=0.02, 1 outlier excluded), required greater physiotherapy and occupational therapy input (178 minutes/week v 110 minutes/week, p<0.05) and were twice as likely (odds ratio 1.98) to have housing/placement/financial issues.

Conclusion: We establish a high prevalence (more than 1 in 3) of C/NDPC amongst those hospitalised with DFD. These patients presented significant challenges, demonstrated inferior outcomes and longer bed occupancy. This underscores the need for continued multidisciplinary involvement including strong psychosocial support . Further studies exploring the relationship of major cognitive and psychiatric illness with diabetic foot outcomes in well characterised cohorts are urgently required.

[O35] INFLUENCE OF PERIPHERAL NERVE SYSTEM ON PROLIFERATION AND MIGRATION OF KERATINOCYTES ON SITE OF ULCERATION

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Diabetic neuropathy is one of the most common late complication of diabetes, as well as the main risk factor of DFU. Damage to the integrity of the skin leads to activation of keratinocytes, triggers a cascade of reactions that contribute to changes in the phenotype of the epidermal cells lead to their migration and proliferation.

Aim: To assessment of **proliferation and migration of keratinocytes** at the nonhealing edges of neuropathic wounds.

Materials and methods: 16 patients with DF neuropathic ulcers (ulcer group) and 9 diabetic patients without ulcers (control group) were included. There were DM2 – 14 (87,5%), male-10 (62,5%), mean disease duration – years 17 [13-20], ulcer duration was about 12 months. DF patients were underwent to standard treatment including debridement, atraumatic dressing, offloading with removable total contact cast, antibacterial therapy if it needs. Measurement of ulcer size and punch ulcer biopsy samples were done for Hematoxylin/Eosin and immunohistochemical analysis on 0 and 10 days of treatment. All patients underwent an evaluation of neurologic signs and symptoms according to the NDS, CCM for estimation of corneal nerve fibre density (CNFD) and fibre length (CNFL).

Results: All patients have severe neuropathy according to NDS(>8). CCM in group with ulcers showed a significant reduction in CNFD (20,1±7.4 v 36.1±4.1no/mm2, p <0.0001). The average size of DF ulcers before and on 10th day of treatment was of 5.56 cm2 and 4,29 cm2, respectively (p<0,004).
Neuropathic ulcers were characterized by hyperproliferative epidermis. Mitotically active keratinocytes reside throughout the suprabasal layers. Corneocyte cells comprising the top layer of the epidermis express primarily α7nAChR. Immature (basal) keratinocytes located within the base layer of the epidermis express primarly α3β2. All keratinocyte cells appear to express α9nAChR.

Conclusions: Peripheral nervous system plays an important role in keratinocytes cycle and tissue repair. Identifying common signaling pathways that contribute to cutaneous inflammation and immune function. It will facilitate better understanding the therapeutic strategies in patients with DFU.

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[O36] THE ASSOCIATION OF ENDOTHELIAL PROGENITOR CELLS WITH PERIPHERAL NEUROPATHY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Aim: Endothelial progenitor cells (EPCs) are a population of adult stem cells with the ability to differentiate into epithelial cells and to promote endothelial regeneration and neo-vascularization in response to tissue ischemia. Several studies have reported an association between EPCs dysfunction and diabetic macrovascular complications. Although peripheral neuropathy (PN) has been associated with changes in the microcirculation and reduced endothelial-dependent and -independent vasodilation, regardless of the presence of macrovascular disease, data about its association with EPCs are scarce. The aim of the present study is to evaluate the relationship between PN and EPCs in patients with type 2 diabetes mellitus (DM).

Method: A total of 59 patients with DM (29 without PN and 30 with PN) and 20 healthy controls were recruited. Participants were non-smokers and had no clinical macrovascular disease. After venipuncture peripheral blood mononuclear cells (PBMCs) were obtained and stained with monoclonal antibodies against CD45, CD34, CD309 and CD133. A hierarchical gating strategy was employed to count low expressing CD45 cells and $1x10^6$ events per subject was acquired and analyzed using the 6-color flowcytometer*. EPCs were defined as cells expressing the $CD45^{dim}/CD34^+/CD309^+/CD133^+$ phenotype.

Results/Discussion: The number of EPCs differed significantly between the 3 groups of participants (p=0.015). The sub-analysis showed that patients with PN had significantly higher number of EPCs when compared with patients without PN [39 (28, 59) vs. 23 (13, 35), p=0.020] and participants without DM [39 (28, 59) vs. 18 (12, 38), p=0.012]. No significant difference was observed in the EPCs number between patients without PN and participants without DM (p=0.476).

Conclusion: The number of EPCs was significantly higher in patients with PN in comparison with patients without PN and participants without DM. This finding may imply that there is an effort for restoration of the damaged peripheral nerves and more research is warranted to clarify the role of EPCs in diabetic PN.

*BD FACSCanto

[O37] THE DISCONNECT BETWEEN THE PRESENCE OR ABSENCE OF CLINICAL DIABETIC FOOT INFECTION AND POSITIVE BACTERIAL CULTURES

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Aim: The diagnosis of infection in the diabetic foot can be challenging, as the microbiology and the pathology is complex. The working consensus is to take tissue samples when there are signs of infection. The aim of this study was to investigate the microbiological growth of pathogenic organisms from samples taken from clinically non-infected and infected wounds.

Method: Retrospective analysis of microbiology results from consecutive new patients on their first visit to the Diabetic Foot Clinic, between May to October 2016. We excluded patients with necrosis and non- salvageable limbs, and new patients who attended clinic after discharge from the ward. We compared the type of microbiology samples, and pathogenic organisms (Staphylococcus aureus, Pseudomonas aeruginosa, Beta-haemolytic Streptococcus) between patients with clinical signs of infection versus patients without clinical signs of infection.

Results/Discussion: A total of 80 patients were sampled. Mean age 65±14yrs, 56% males. 63% of the patients did not have clinical signs of infection and 37% had clinical signs of infection. 16% of samples were surface swabs, 63% were from deep swabs, 16% were from deep tissue and 5% were from bone samples. Of the surface swabs 31% were positive with no significant difference between clinically infected and non-infected ulcers, 33% vs 29% [p=0.881], Of the deep swabs 64% were positive with no significant difference between the two groups 61% vs 71% [p=0.513]. Of the deep tissue samples 85% were positive with no significant difference between the two groups 86% vs 83% [p=0.886]. There was no significant difference in pathogenic organisms between the two groups 54% vs 47% [p=0.547]. There was no significant difference in the proportion of positive results between swabs (surface and deep) and tissue (deep tissue and bone) 57% vs 82% [p=0.061].

Conclusion: The absence or presence of clinical signs of infection does not fully correlate with the microbiology yield, regardless of whether the samples are taken from surface swabs, deep swabs or deep tissue. Our data therefore supports the use of other means of identification of virulence of organisms, such as genotyping, as reliance on clinical signs of infection can be deceptive.

[O38] EVALUATION OF SPECT/CT IN PATIENTS WITH DIABETIC FOOT INFECTIONS - A FIVE YEAR'S EXPERIENCE

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Aim: Correct diagnosis and treatment of osteomyelitis is a challenge in patients with a diabetic foot ulcer. Actually, osteomyelitis is diagnosed on clinical grounds, after bone biopsy, or during imaging (X-ray, bone scintigraphy, or magnetic resonance imaging - MRI). The aim of this study is to present our experience with SPECT/CT.

Method: All patients with a new diabetic foot ulcer, presenting from January 1st, 2012 until December 31st, 2016 at the Diabetic Foot Clinic from the Antwerp University Hospital were evaluated for inclusion. All patients where presence of an osteomyelitis was considered, were included. The SPECT-CT used was the GE Discovery Tandem NM/CT 670, which is a combination of a dual head gamma camera and a 16 slice helical CT.

Results/Discussion: Three hundred sixteen ulcers (234 patients, 158 males/76 females, mean age 67 years) were evaluated. The majority of patients suffered from neuropathy (64%), nephropathy (56%), and peripheral arterial disease (67%). Sixty patients had more than one SPECT-CT performed, because of a second ulcer, or a change in clinical presentation during the study period. Distribution of the lesions was: toe (168), metatarsophalangeal joint (79), ankle (20), heel (30), and other (19). Clinical suspicion of osteomyelitis (positive probe-to-bone test or sausage toe) was present in 50 cases.

Based on the findings of SPECT-CT, osteitis or osteomyelitis was suspected in 201/316 ulcers (64%). When relating these results to the findings of bone biopsy (available in 36 cases after toe amputation), MRI (50 cases), and clinical degree of suspicion for osteomyelitis (positive probe to bone test or sausage toe, 50 cases), we could calculate a sensitivity of respectively 96%, 90% and 82%; the specificity was 18%, 75% and 40%.

Conclusion: Diagnosis of osteomyelitis remains difficult, due to a lack in golden standard. In this retrospective five-year evaluation, SPECT/CT offers a good sensitivity but a low specificity for diagnosis of osteomyelitis. SPECT/CT can be used to differentiate between osteitis/osteomyelitis and other pathologies of the diabetic foot.