Healthy or Unhealthy Migrants? Identifying Internal Migration Effects on Mortality in Africa using Health and Demographic Surveillance Systems

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Migration has been hypothesised to be selective on health but this healthy migrant hypothesis has generally been tested at destinations, and for only one type of flow, from deprived to better-off areas. The circulatory nature of migration is rarely accounted for. This study examines the relationship between different types of internal migration and adult mortality in Health and Demographic Surveillance System (HDSS) populations in West, East, and Southern Africa, and asks how the processes of selection, adaptation and propagation explain the migration-mortality relationship experienced in these contexts. The paper uses longitudinal data representing approximately 900 000 adults living in nine sub-Saharan African HDSS sites of the INDEPTH Network. Event History Analysis techniques are employed to examine the relationship between all-cause mortality and migration status, over periods ranging from 3 to 14 years for a total of nearly 4.5 million person-years. The study confirms the importance of migration in explaining variation in mortality, and the diversity of the migration-mortality relationship over a range of rural and urban local areas in the three African regions. The results confirm that the pattern of migration-mortality relationship is not exclusively explained by selection but also by propagation and adaptation. Consequences for public health policy are drawn.

Key words: Internal Migration, sub-Saharan Africa, Mortality, Health and Demographic Surveillance System
Intra-familial Aggregation and Heritability of Tissue Doppler Indexes of Left Ventricular Diastolic Function in a Group of African Descent.

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There are limited proven therapies for heart failure with a preserved ejection fraction (associated with a reduced diastolic function) and hence identifying the mechanisms responsible is of importance. Although several indexes of left ventricular (LV) diastolic function show heritability, the genetic influence on the tissue Doppler index, E/e' (early transmitral velocity/velocity of myocardial tissue lengthening), an index of LV filling pressures in those of black African descent is currently unknown. Intra-familial aggregation and heritability (SAGE software) of E/e' (echocardiography) were assessed in 129 nuclear families (29 spouse pairs, 216 parent-child pairs and 113 sibling-sibling pairs) from an urban developing community of black Africans. Independent of confounders including LV mass index (LVMI) and relative wall thickness (RWT), E/e' was correlated in parent-child (r=0.23, p<0.001) and sibling-sibling (r=0.29, p<0.005), but not in spouse (r=0.13, p=0.51) pairs. The relationships between parent-child and sibling-sibling pairs persisted with adjustments for aortic pressure. The relationships between parent-child (r=0.22, p<0.001) and sibling-sibling (r=0.26, p<0.01) pairs also persisted with adjustments for backward wave pressures (Pb). Independent of confounders including LVMI and RWT, E/e' showed significant heritability (h²±SEM=0.51±0.11, p<0.0001) which similarly persisted with adjustments for aortic pressure. In conclusion, in a group of African ancestry, independent of LV remodeling and aortic function, E/e', shows significant intra-familial aggregation and robust heritability. Hence, genetic factors may play an important role in determining moderate-to-severe LV diastolic dysfunction in groups of black African ancestry.

Key words: Left ventricular diastolic function, heritability, aortic function
Vitamin D levels of anaesthetists in the Department of Anaesthesiology at the University of the Witwatersrand

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There has been a resurgence of interest in vitamin D and its effects. Theatre personnel should be cognisant of vitamin D deficiency as an occupational hazard, as it is a global problem that has been studied extensively in colder climates. No research was identified among medical personnel in South Africa. The primary objective of this study was to describe serum 25(OH)D (25-hydroxyvitamin D) levels of anaesthetists. The secondary objective was to describe and compare factors influencing vitamin D levels in anaesthetists who are vitamin D insufficient to those who are not. Data was collected in winter 2013. Anaesthetists agreeing to participate signed the informed consent. They then completed the questionnaire comprising demographics and secondary objectives. Each participant had 5 ml of blood collected into an EDTA specimen tube. The samples were processed by qualified laboratory personnel using High Performance Liquid Chromatography determine 25(OH)D levels using a Shimadzu® Ultra performance liquid chromatography system. The median 25(OH)D was 43.8 nmol/l (IQR 26-76), with 51 of 89 (57.30%) anaesthetists being vitamin D insufficient. There was a statistically significant association between ethnicity and vitamin D status (p<0.001). 21 (80.77%) Indian anaesthetists and 14 (70.00%) black anaesthetists were insufficient, as compared to only 10 (28.57%) white anaesthetists. Vitamin D is no longer a forgotten vitamin. Anaesthetists should be considered at risk for vitamin D deficiency. Adequate vitamin D levels should be seen as essential rather than optional even in “sunny” climates.

Key words: Vitamin D, deficiency, anaesthesiology
Reflected Waves Obtained Using a Triangular Flow Wave Method are as Closely Related to Left Ventricular Mass as those Obtained Using Echocardiographic Derived Aortic Flow Waves

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Aortic backward (reflected) waves are major determinants of cardiovascular events and their impact is independent of brachial blood pressure. Although aortic backward wave pressures (Pb) can be determined using a triangular flow wave form for wave separation analysis, Pb derived from this approach correlates poorly with Pb derived from measured aortic flow waves. However, the comparative ability of these two Pb measurements to predict end-organ changes remains uncertain. Therefore, we aimed to compare Pb obtained using a triangular flow wave method (Pbtri) and Pb obtained using echocardiographic derived aortic flow velocity waves (Pbecho), and their relationships with left ventricular mass index (LVMI). In 300 participants from a black African community sample (age>16 years), aortic haemodynamics (applanation tonometry, SphygmoCor software), aortic flow velocity and LVMI (echocardiography) were determined. Bland-Altman analysis revealed that Pbtri overestimated the backward wave pressure by an average of 3.62±3.17mmHg. However, the correlation between the two measurements was markedly high (r²=0.88). Independent of confounders, Pbtri was associated with LVMI (partial r=0.21, p<0.0001). Importantly, when comparing the association between Pbecho and LVMI (partial r=0.24, p<0.0001) no differences were noted (p=0.35, for comparison of partial r values, Z score). In conclusion, a triangular flow wave form employed for wave separation analysis produces Pb values that are as closely associated with LVMI as those derived from echocardiographic aortic flow wave measurements.

Key words: Backward wave pressures, Triangular flow wave, Left ventricular mass
The Relationship Between Physical Function and Disease Activity in Rheumatoid Arthritis: Results from the METEOR Database

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The Health Assessment Questionnaire Disability Index (HAQ-DI) is the most widely used disease-specific measure of physical disability in rheumatoid arthritis (RA). In this study we investigated the response to standard of care treatment based on the HAQ-DI and EULAR response criteria in a cohort of established RA patients. 421 active RA patients with complete HAQ-DI scores and disease activity scores were selected from the International Measurement of Efficacy of Treatment in the Era of Outcome in Rheumatology (METEOR) database. Cumulative probability curves were created to visualize the change in HAQ-DI between the different response groups. The proportions of patients achieving a Minimally Clinically Important Difference (MCID) of 0.22 improvements or deterioration of the HAQ-DI were calculated. The cohort showed the typical RA female predominance; had very active disease and moderate functional disability. As a group the patients showed an improvement in all variables of disease activity and HAQ-DI scores after a mean period of 8.7 months. When applying the EULAR response criteria, 47% achieved a good/moderate response and the remainder had a poor response. The proportions of patients achieving a clinically important improvement, deterioration and no change of the HAQ-DI scores were 36%, 13% and 51% respectively. In this cohort of patients with established RA and high disease activity, less than 50% of patients achieved a EULAR good/moderate response. In spite of this, the majority of patients (87%) showed no change or had an improvement in physical function according to the HAQ-DI.

Key words: Rheumatoid Arthritis, Functional Disability
Health and ageing in Africa: Longitudinal studies of an INDEPTH community (HAALS1)

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Worldwide, by 2050, adults 65+ will outnumber children under-5 by a factor of 2.5. Yet evidence on the health, care and support of older persons is minimal. HAALS1, a collaboration of the Agincourt Unit, INDEPTH Network and Harvard University launched in South Africa in 2014. Focused on successful ageing in rapidly transitioning African contexts, we established a randomly selected cohort of 5,000 participants 40 years and over to address the trajectories of chronic disease and risk, their social, biologic and economic determinants, consequences for physical and cognitive function, and socioeconomic impacts. Fieldwork was conducted in the Agincourt sub-district, supported by a robust health and socio-demographic surveillance system (pop. 116,000); with pilot studies in Navrongo, Ghana and Ifakara, Tanzania. Features include follow-up of labour migrants, tablet-based cognitive assessments, and serology for HIV status and ART adherence; samples for genomic analyses involve a Wits-H3A Collaborating Centre. The study will support validation/correlation assessments between dry blood spot and venous markers, as well as between tablet-based and standard cognitive tests. Baseline findings on disease outcomes, risks and behaviours associated with cardiometabolic disease, HIV/AIDS and cognitive function among older adults in rural SA will be presented. Prior work suggests that poor self-reported health correlates with subsequent death. Mortality and cause-of-death trends among elders in sub-Saharan Africa, using publicly accessible data from the INDEPTH iShare repository, will also be reviewed. Further survey waves are planned for 2017-18 and 2020-21; in time we expect work to inform clinical, health and social policy development.

Key words: Ageing, chronic, health-transition, rural
Omentin concentrations are independently associated with those of matrix metalloproteinase-3 in patients with mild but not severe rheumatoid arthritis

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Adipose tissue derived adipokines are determinants of systemic metabolism and may contribute to cardiovascular pathology. We investigated the associations of omentin concentrations with subclinical cardiovascular disease in patients with rheumatoid arthritis (RA). Omentin concentrations were measured in 213 (104 black; 109 white) RA patients. Relationships of omentin levels with endothelial activation markers, carotid intima-media thickness and plaque, and matrix metalloproteinase (MMP)-2, -3 and -9 were identified in multivariate regression models. Omentin concentrations were inversely associated with MMP-3 levels (β=-0.364 (0.113), p=0.002). In stratified analysis, the omentin-MMP-3 concentration relationship was reproduced in white (β (SE)= -0.450 (0.153), p=0.0004) but not black patients (β (SE)= -0.099 (0.195), p=0.6), in participants with disease remission or mild disease activity (β (SE)= -0.411 (0.139), p=0.004) but not with moderate or severe RA activity (β (SE)= -0.286 (0.202), p=0.2), and in those with a small (β (SE)= -0.534 (0.161), p=0.001) but not large erythrocyte sedimentation rate (ESR) (-0.212 (0.168), p=0.2) and without (β (SE)= -0.554 (0.165), p=0.0001) but with large joint deformity counts (-0.110 (0.173), p=0.5). Omentin levels were unrelated to endothelial activation and atherosclerosis in these patients. Omentin concentrations were inversely associated with those of MMP-3 - a surrogate marker of plaque vulnerability to rupture - in white but not black Africans with RA. This inverse relationship was absent RA patients with moderate or severe RA activity and large ESR values and joint deformity counts. A loss of beneficial effects of omentin on plaque instability may contribute to the link between severe disease and increased cardiovascular risk in RA.

Key words: Omentin, Rheumatoid, Arthritis, Disease
Profiling of the human cell-cycle related genes’ expression in human non-small cell carcinoma treated with Efavirenz and Lopinavir/ritonavir

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South Africa has the largest ARV treatment programme in the world, wherein highly active antiretroviral treatment (HAART) has improved the quality of life in HIV/AIDS patients. On the contrary, cancers not previously associated with HIV/AIDS (non-Aids defining cancers; NADCs) have been shown to be increasing, compared to the AIDS defining cancers (ADCs). Lung cancer, as a NADC has been documented in the HIV/AIDS population. The poor understanding of the association between ARV drugs and lung cancer places a burden on public health, both globally and in SA. This study aimed to investigate the effects of Efavirenz and Lopinavir/ritonavir at plasma relevant levels in in-vitro lung cancer models. Since the deregulation of the cell cycle is a hallmark of lung cancer, the effects of EFV and LPV/r were screened on an arrayed panel of human cell cycle genes in the MRC-5 (lung epithelial cell line) and A549 (non-small cell lung cancer) lung cell-lines. Significantly expressed targets were further quantified and confirmed by RT-qPCR. Bio-informatics analysis (using STRING and Reactome) was done to further investigate potential interaction/s between the identified targets, and to determine novel target involvement in related biological pathways. Importantly, two identified targets, CASP3 and AURKB were shown to be either up or down-regulated, functioning at key cell cycle checkpoints and in cell cycle arrest. These findings demonstrate an effect of EFV and LPV/r on cell cycle related genes, acting to stimulate cell proliferation and thus suggesting their role in lung cancer.

Key words: HAART, Lung cancer, Cell cycle
Early growth and blood pressure trajectories in urban South African children: Birth to Twenty cohort

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Early life growth has been shown to be associated with cross-sectional blood pressure (BP) values, but whether or not early life growth patterns are associated with longitudinal BP trajectories is under-researched. Therefore, we sought to examine the association between early growth and BP trajectories from childhood to adulthood. Data were utilized from the Birth to Twenty Plus cohort, from which black South African children (n=1937, 52% girls) were selected for the analytical sample. BP was measured on seven occasions between ages 5 and 18 years and conditional variables for growth in infancy and mid-childhood were computed from anthropometric measures. We used a group-based trajectory modeling approach to identify distinct BP trajectories and then tested their association with growth between birth and mid-childhood unadjusted and adjusting for several covariates. Three sex-specific trajectory groups were identified for systolic BP (SBP) and diastolic BP (DBP): ‘lower’, ‘middle’ and ‘upper’ in both boys and girls. Height between 5 and 18 years was positively associated with SBP trajectories in boys and girls. In the final adjusted models taking into account height, prominent predictors in boys of the middle and upper SBP trajectories in comparison to the lower trajectory were birth weight (odds ratio [OR] 0.75[95% CI 0.58–0.96]) and relative weight gain in infancy (4.11[1.25–13.51]). In girls, greater relative weight gain and relative linear growth in both infancy and mid-childhood were consistently associated with an almost 2-fold increase in OR of being in the upper versus lower SBP trajectory. Distinct trajectories of BP were identified with the upper trajectory potentially indicating greater risk for adult hypertension. Targeted early life interventions to address greater relative weight gain may be able to lessen the odds of being in a higher BP trajectory in late adolescence and early adulthood.

Key words: BP trajectories, weight gain, linear growth
Effects of ursolic acid on metabolic programming of diet-induced metabolic dysfunction in Sprague Dawley rats

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Nutritional experiences during the perinatal period are known to influence health outcomes later in life. This dietary programming of metabolism and the consumption of fructose-rich diets have been implicated in the increase of metabolic disorders worldwide. Phytochemicals such as ursolic acid (UA), which affect metabolism, may promote metabolic programming in neonates thereby imparting positive health benefits in adulthood. The effects of early administration of UA on subsequent development of complications associated with diet-induced metabolic dysfunction in Sprague Dawley rats were investigated. Six-day old suckling male and female Sprague Dawley rats (N=107) randomly received 10 ml/kg of either 0.5% dimethylsulphoxide (control), UA, 50% fructose solution or a mixture of 50% fructose and UA orogastrically for 14 days. They were then weaned onto normal rat chow and plain drinking water on day 21. At adulthood (day 70), half the number of rats in each treatment group received either plain drinking water or 20% fructose solution in drinking water for eight weeks. Body mass gain, fasting blood triglyceride concentrations, adiposity and hepatic lipid accumulation were assessed. Fructose consumption in adulthood caused increased (P< 0.05) body mass and circulating blood triglycerides in males whilst it had no effect on adiposity in both sexes. In females, fructose consumption both neonatally and in adulthood caused significantly increased hepatic lipid accumulation (P? 0.0001). Neonatal administration of UA prevented fructose-induced hepatic lipid accumulation in both sexes. Although fructose administration had adverse metabolic effects, neonatal intervention with UA was hepatoprotective and showed great potential in hepatic lipid metabolism control.

Key words: Ursolic acid, metabolic programming, metabolic dysfunction
Improved sleep inertia in the morning in healthy older adults following exposure to bright blue-enriched light the previous evening.

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Exposure to light can have acute alerting and circadian phase-shifting effects. This study investigated the effects of evening exposure to blue-enriched (BEL) vs. polychromatic white light (WL) on sleep inertia dissipation the following morning in older adults. Ten healthy older adults (average age=63.3 yrs; 6F) participated in a 13-day study consisting of three baseline days, four days with 2-h evening light exposures, wedged between two constant postures for pre- and post- light exposure circadian phase assessment, and 3 final days. Participants were randomized to either BEL or WL of the same irradiance. At 2, 12, 22 and 32 minutes after each wake time during the study, the participants completed a 90-s digit-symbol substitution test (DSST) to assess cognitive throughput. Number of correct DSST responses in the 90s trial was used as the outcome variable. Correct DSST responses increased with time awake (p<0.0001) and across study days in both groups (p<0.0001). There was no main effect of group, although we observed a significant day x group interaction (p=0.0004), whereby participants exposed to BEL performed significantly better on the first two mornings after light exposures than participants in WL (post-hoc p<0.05). These effects were not due to changes in circadian phase or phase angle of entrainment, because both groups showed similar phase-delay shifts. Exposure to blue-enriched white light in the evening significantly improved DSST performance after the following wake time when compared to ordinary white light.R01-AG06072, T32-HL07901, F32-AG03169, SAMRC.

Key words: Cognition, light exposure, aging
Post-Exercise Effects on Aortic Wave Reflection Derived from Wave Separation Analysis in Young-to Middle-Aged Pre-hypertensives and Hypertensives.

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Decreases in brachial blood pressure (BP) may occur for several hours following a bout of exercise. Although aortic backward waves predict cardiovascular damage independent of brachial BP, whether decreases in aortic backward waves also occur post-exercise; the extent to which these changes exceed brachial BP changes; and the best method of identifying these changes is uncertain. We examined aortic function at baseline and 15 minutes post-exercise in 20 pre-hypertensive or hypertensive men and women (age: 45±7 years). Central aortic pressure, forward (Pf) and backward (Pb) wave pressures, the reflection index (RI) and augmentation pressure (AP) and index (Alx) were determined using applanation tonometry, and wave separation analysis with SphygmoCor software. Decreases in central aortic (p<0.001) but not brachial systolic BP and pulse pressure (PP) occurred post-exercise. In addition, decreases in post-exercise (baseline versus post-exercise) Pb (19±4 vs 13±3 mm Hg p<0.0001), RI (72.9±22.1 vs 47.6±12.8%, p<0.0001), Alx (26.3±10.8 vs 7.8±11.6%, p<0.0001) and AP (9.9±3.9 vs 2.8±3.9 mm Hg, p<0.0001), but not Pf were noted. However, decreases in Alx were not correlated with decreases in Pb, and whilst decreases in aortic PP correlated with decreases in Pb (p<0.0001), no correlations were noted with decreases in AP or Alx. In pre-hypertensive and hypertensive individuals, aortic backward waves decrease post-exercise; this change is not reflected in brachial BP measurements and is poorly indexed by measures of pressure augmentation.

Key words: Aerobic exercise training, reflected wave, forward wave
Cardiorespiratory fitness levels and associations with physical activity and body composition in young South African adults in Soweto

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This study aims to describe fitness levels in 423 young black South African adults from Soweto, examining associations with physical activity and BMI. A sub-maximal ramped step test was used to obtain an estimate of maximal oxygen uptake (VO₂max). Physical activity was measured using ActiGraph (GT1M) for one week. Time spent in sedentary (<100 counts per minute (cpm)), moderate (≥2020 and ≤5998 cpm) and vigorous (≥5999 cpm) intensity activity was calculated, and 90% of participants were considered active according to CDC recommendations. Overweight and obesity was more prevalent in females than males (35% vs 8%, p<0.001). Males had a higher VO₂max than females (43.0(4.5) vs 34.5(4.0) mlO₂/min/kg, p<0.001); spent more time in moderate to vigorous physical activity (MVPA) (83(60-111) vs 43(25-54)min/day, p<0.001), and less time in sedentary behaviours (p<0.00). Sedentary time (9 hours 20 minutes) was not associated with VO₂max, however BMI was inversely-, and MVPA positively, associated with VO₂max (both p<0.001). Most young South African adults in this study were sufficiently active. MVPA and BMI are both strongly associated with fitness. Males were fitter, more physically active, and had lower BMIs than females. The high level of sedentary behaviour in this population is of concern.

Key words: Cardiorespiratory fitness, physical activity, body composition, South Africa, young adults
Effect of orally administered S-allyl cysteine (SAC) on hepatic lipid accumulation and markers of general health in suckling Wistar rat pups fed a high-fructose diet

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There is an increase in childhood obesity and associated complication including non-alcoholic fatty liver disease (NAFLD). The beneficial antiobesity properties of garlic and S-allyl cysteine (SAC), a phytochemical derived from garlic, have been investigated in drug-induced adult models of obesity but not in diet-induced models in growing animals. Thus this study interrogated the effects of SAC in high-fructose diet fed rat pups. Sixty-four 6-day old male (n = 32) and female (n = 32) Wistar rat pups, randomly allocated to four groups, received the following treatment daily for 15 days (postnatal day 6 to 20): I - 10 ml/kg distilled water (DH), II - 20% fructose solution (FS), III - 150 mg/kg SAC, IV - 150 mg/kg SAC + 20% fructose solution (SAC + FS). The pups' blood cholesterol, glucose and triglyceride concentration were then determined. Immediately thereafter the pups were euthanized and blood collected for the determination of surrogate markers of health. Liver samples were collected for glycogen and lipid content determination. The administration of FS or SAC + FS had no effects on the measured parameters across treatment groups. However, in female pups the administration of SAC significantly increased (P ≤ 0.05) hepatic lipid content and significantly decreased (P ≤ 0.05) hepatic glycogen content. These findings suggest that administration SAC induced lipid accumulation in female rat pups which could predispose them to NAFLD.

Key words: S-allyl-cysteine, hepatic lipid, high-fructose diet
The Prevalence of the Metabolic Syndrome and Related Disorders in South Africans with Psoriasis

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Psoriasis (PsO) is an immune-mediated inflammatory disorder in which cardio-metabolic comorbidities are increasingly recognised. There are no data from sub-Saharan Africa on the relationship between PsO and cardiometabolic disease risk factors. The objective of this study was to determine the prevalence of the metabolic syndrome (MS) and related disorders in PsO patients. Adult PsO patients (n=95) were recruited from the Dermatology and Rheumatology clinics at hospitals of the Wits Academic Complex. Demographic, anthropometric and cardiometabolic data were recorded. Disease severity of PsO was assessed using the psoriasis area and severity index (PASI) scoring method. Components of MS were defined according to the Harmonized guidelines. The mean ±SD age and disease duration were 52.6±14.6 and 17.6±13.3 years, respectively. The mean BMI and waist circumference were 31.9±8.64 kg/m² and 101.4±16.9 cm, respectively. The prevalence (% [95% CIs]) of obesity was 51.6 [41.3, 61.8], T2D was 31.2 [20.6, 41.7], hypertension was 76.8 [68.2, 85.5], hypercholesterolaemia was 54.2 [42.4, 65.9] and psoriatic arthritis (PsA) was 27.4 [18.2, 36.5]. The prevalence of MS was 58.1 [46.6, 69.6] %. Multivariate logistic regression analysis showed that Indian ethnicity was associated with a higher risk of MS (odds ratio [95 % CIs]: 6.64 [1.28, 34.4]; p=0.02), as was a higher PASI score (4.34 [1.00, 18.9]; p=0.05). A higher socio-economic status was associated with a lower risk of MS (0.14 [0.02, 0.84]; p=0.03). The prevalence of obesity and its complications is high in this population suggesting screening for cardiometabolic diseases should form part of routine care in PsO patients.

Key words: Psoriasis, metabolic, syndrome
Interaction between high sodium and low potassium intake on blood pressure in adult Sprague-Dawley rats

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While an increase in sodium intake (Na+) increases blood pressure (BP), it is uncertain to what extent potassium (K+) affects Na+-induced increases in BP and the mechanism responsible for the increased BP. The aim of the present study was to determine whether Na+-induced increases in BP and changes in vascular reactivity are altered by reductions in K+ intake. Four-month-old male Sprague-Dawley (SD) rats were randomly assigned to three dietary intervention groups for six weeks: a normal Na+ (0.3%), normal K+ (1.6%) group (CON, n=12), a high Na+ (6%), normal K+ (1.6%) group (NormK+, n=12) and a high Na+ (6%), low K+ (0.01%) group (LowK+, n=12). Tail-cuff BP was measured weekly. At termination, urinary Na+ and K+ concentrations were measured. Vascular reactivity of the mesenteric arteries was also assessed using a wire-myograph. The urinary Na+/K+ ratio was higher in the LowK+ compared to CON and NormK+ (P<0.001). The increase in systolic BP over 6 weeks was greater in LowK+ compared to CON (P=0.04). The increase in diastolic BP (mm Hg) was greater in NormK+ and LowK+ compared to CON (P=0.05 and P=0.02, respectively). The increase in BP was not different between NormK+ and LowK+ (P>0.05). In mesenteric arteries at termination, the phenylephrine dose-response curves were shifted to the left in NormK+ compared to CON (P=0.02) and similar between NormK+ and LowK+ (P=0.82). Na+ induced greater phenylephrine-induced contractions which may be responsible for the increase in BP. However, a deficit in K+ intake does not worsen the high Na+ intake effects.

Key words: Sodium, potassium, blood, pressure
Exposure to secondhand smoke among pregnant women in Soweto, South Africa

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Tobacco secondhand smoke (SHS) has long being known for all its negative health effects. This work aimed to determine the SHS exposure rate in the pregnant population of Soweto. This was a prospective, cross sectional study undertaken at Chris Hani Baragwanath Academic Hospital. Soweto serves in excess of two million people, with more than 23 000 delivers annually in the hospital. This study used a questionnaire to survey a sample of pregnant women who were post caesarean section. A total of 100 women were interviewed. Twenty one percent reported to be exposed to SHS at home and 18% of the employed participants exposed at work. Forty three percent of the participants lived with a regular smoker and 73% had banned smoking in their house. However, even though the bans had been put in place, smoking still occurred in some of their homes. There was a statistically significant difference in the number of regular smokers that the participant lived with, with SHS-exposed participants being more likely to live with a regular smoker than with no regular smokers in the house. Ninety one percent of participants were aware that SHS could have a negative effect on their babies while pregnant, and knew about health risks with SHS. This study showed that in spite of strict anti-tobacco laws, a high percentage of pregnant women reported to be exposed to SHS at home and at work. Most were aware of the health risks of SHS, and tried to ban smoking in their homes.

Key words: Secondhand smoke in pregnancy
Time to the Peak of the Aortic Forward Wave Determines the impact of Aortic Backward Wave and Pulse Pressure on Left Ventricular Mass.

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There is extensive evidence that in hypertension, aortic blood pressure (BP) adds to brachial BP when risk predicting. This effect is largely accounted for by aortic backward waves. The factors which determine the adverse impact of backward waves on end-organs are uncertain. We aimed to determine the degree to which an extended time to the peak of the aortic forward wave (Ft) or early wave reflection time (Rt) enhance associations between backward wave pressures (Pb) and left ventricular mass index (LVMI). In 812 adult participants from a community sample we assessed aortic haemodynamics and LVMI (echocardiography). An interaction between Ft and Pb was independently associated with LVMI (p≤ 0.0001) and LV hypertrophy (LVH) (p=0.001). The Ft-Pb interaction translated into an increase in the independent association between Pb and LVMI (p≤0.0001 for comparison of slopes and strength of relations) or LVH (p≤0.01 for comparisons of Odds ratios). A markedly better ability of Pb, but not forward wave pressures to detect LVH was noted in the highest as compared to the first three quartiles of Ft (p<0.01). In contrast, Rt failed to influence the impact of Pb on LVMI. In conclusion, time to the peak of the aortic forward wave, but not early wave reflection markedly influences the impact of aortic backward wave pressure and hence aortic PP on LVMI and LVH in adults. This data suggest that underlying the time to the peak of the forward wave may be an important risk factor in African ancestry.

Key words: Central blood pressure, reflected waves, left ventricular mass index.
Breast and Cervical Cancer Awareness and Practice among women in informal Sector, Nigeria

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There is no general consensus on why the lifetime risk of dying from cancer in African women is several times higher than that of women from developed countries. However, due to little or no awareness and the low level of cancer screening in African women the window of opportunity for prevention and cure is often wasted. This study examined the relationship between breast and cervical cancer awareness and screening among women in informal sector to be able to develop a contextual program for timely intervention. We performed a cross-sectional study in women between the ages of 15 and 49 years to examine the correlation between cancer awareness and participation in cancer screening. This work adopted both quantitative and qualitative research approaches. Outcome measures included awareness of breast and cervical cancer, how it can be prevented or detected, and the availability and actual participation in screening exercises. The results from the study show that while women are familiar with breast cancer, little is known about cervical cancer and the awareness of the former is not correlated with participation in cancer screening. The lack of enthusiasm to seek cancer screening is rooted in three key factors: lack of specific information, religious beliefs, economic and inadequate screening facilities. The study thus recommends that, policies and programs aimed at breast and cervical cancers awareness and early intervention should address these underlying problems of accessibility of screening facilities, cost of service and appropriate way of enlightening the informal sector women on the benefit of cancer screening.

Key words: Women, Breast, Cervical cancer, Awareness, Practice
Men's Sexual Health Problems and Appraisal of Wives Coping Strategies

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Systematic studies on the relationship between men’s sexual dysfunction and marital conflict are emerging. However, the coping strategies adopted by wives under such circumstances are lacking in the literature. Male sexual functioning is vital to marital success and its limitation impairs marital relationship, causes intolerable cohabitation, and can stimulate infertility, and stigma in sub-Saharan Africa. The coping strategies employed by women to these encounters have the potential to lessen or prevent maladaptive outcomes and engender a sustainable intact (stable) marital relationship. Thus study therefore examined the coping strategies adopted by women whose husbands have reproductive health challenges in two of the five states with highest proportion of divorced/separated in Nigeria. Four focus group discussions were organized in two local government areas from the two states. The women were recruited from a quantitative couple-study where the men have experienced any sexual health problems. The responses were transcribed and analyzed using a ‘systematic-content-analysis’ technique with simple thematic organisation of summaries and systematic typologies of participants’ responses. The results revealed coping strategies employed by the women as: seeking guidance from their religious leaders and family doctors, physical-sexual-therapy, abstinence/religiosity and concubinage. The participants indicated it is sacrilege reporting husbands’ sexual health problems publicly. The study concludes that husband’s sexual ability is crucial to sustenance of the marital relationship; that religious leaders and family doctors are indispensable mediators in husband-wife conflict management but concubinage could make wives vulnerable to STIs/HIV and AIDS. The authors recommend public enlightenment on men’s sexual health problems for the wives while medical officers (family doctors) and religious leaders could be trained on family-conflict management as a strategy to stem increasing marital conflict/dissolution in the study locations and in sub-Saharan Africa.

Key words: Wives, coping strategy, men sexual health problem, conjugal relationship
Chronic Kidney Disease Epidemiology Collaboration-Derived Glomerular Filtration Rate Performs Better at Detecting Pre-Clinical End Organ Changes than Alternative Equations in Black Africans.

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Because the relationship between creatinine and glomerular filtration rate (GFR) varies between ethnicities, neither of the more recently developed equations (MDRD, nor the Chronic Kidney Disease Epidemiology Collaboration CKD-EPI) for estimating GFR (eGFR) perform as well in African as they do in Caucasian populations. However, there are no studies in black African populations that have compared the various equations for eGFR in associations with end-organ changes. In 1221 randomly recruited participants of black African ancestry in South Africa, we evaluated serum creatinine concentrations, echocardiographic left ventricular mass index (LVMI) (n=833), carotid-femoral (aortic) pulse wave velocity (PWV) (n=1053) and carotid intima-media thickness (IMT)(n=633). We calculated eGFR from the Jelliffe, 5 Cockcroft-Gault, Salazar-Corcoran, MDRD and CKD-EPI equations. After multivariate adjustments, eGFR calculated from all formulae was inversely associated with LVMI (p<0.0001) and PWV (p<0.05 to <0.001), but not with IMT (p>0.07). However, while eGFR determined from all equations except Cockcroft-Gault lean body weight or adjusted body weight was independently associated with LV hypertrophy (LVH)(n=390 of 833); CKD-EPI-derived eGFR, but not eGFR determined from alternative equations was independently associated with an increased PWV (n=88 of 1053). eGFR derived from the CKD-EPI and MDRD equations showed a better performance (area under the receiver operator characteristic curve) for the detection of LVH (p<0.0005) than eGFR determined from alternative equations. In conclusion, in black Africans, eGFR derived from the CKD-EPI equation is better at detecting end-organ measures than eGFR derived from either the MDRD or alternative equations.

Key words: Derived glomerular filtration rate, end organ changes
Early childhood caries (ECC) is preventable, but widespread. This study described the patients accessing the Dental General Anaesthetic (DGA) service. Further aims were to establish the treatment provided, and the number of unscheduled patients. This was a retrospective study of a sample of the 516 patients treated under DGA at Wits in 2011. The patients were 16 years or younger, and for 299 of them data was retrieved from the patient files, the theatre register and/or the daysheet, captured in Excel and exported into SPSS Version 21 for analysis. The average age of healthy children was 4.9 years. Mentally or physically compromised children were 13.7% of the group with an average age of 9.4 years. Most children were from low socioeconomic groups and 55% of patients travelled more than 10km for treatment. The majority (79.6%) were self-referred to Wits Dental Hospital (WDH). Of the remaining 20%, healthy children were referred more often by private practitioners, and compromised children were referred from other hospitals. The average waiting time for treatment was 5 months, and treatment was almost exclusively extractions. The mean number of extractions was 8.88 per child. 17.4% of patients attended without appointments, but received treatment despite this. Patients accessing DGA at WDH in 2011 were preschoolers from a low socioeconomic background, who presented with advanced early childhood caries. This necessitated multiple extractions under DGA. Caries prevention and early detection would reduce the financial and biological costs of treatment.

**Key words:** Early childhood caries, dental general anaesthetic, paediatric dentistry
Development of a method for studying the in vitro formation of foam cells from human monocytes

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Atherosclerosis is a chronic inflammatory disease characterized by cholesterol accumulation within the walls of arteries. Formation of macrophage foam cells (FC) is a major hallmark of early stage atherosclerotic lesions. Currently there is a lack of suitable cellular models to study FC formation in vitro. Therefore, the aim of this study was to develop a method for converting peripheral blood mononuclear cells (PBMC) into FCs. Blood was collected in EDTA tubes. Buffy coats were harvested by centrifugation, separated by Ficoll-Hypaque gradient (density 1.07 g/ml) and the PBMC layer isolated. The monocytes were washed three times in sterile PBS and cultured overnight with RPMI medium. After 24 hours of culture the monocytes adhered to the culture plate and non-adherent lymphocytes were removed through washing with RPMI. The monocytes were then differentiated into macrophages by incubation over 5 days in standard media supplemented with macrophage colony-stimulating factor (M-CSF (100 ng/ml)). FC formation was induced through exposure of macrophages to OxLDL at a concentration of 3.0 µg/ml for 48 hours. FC formation was determined by Oil red O staining of the intra-cellular lipid. The addition of OxLDL to macrophages resulted in enhanced intracellular lipid accumulation and under microscopic examination they were seen to exhibit classic FC morphology with pronounced staining of intra-cellular lipid droplets. This work resulted in the development of a method allowing for the in vitro generation of FCs from human monocytes and represents a useful tool for studying the molecular mechanisms involved in the control of FC formation.

Key words: Methodology, Monocytes, Foam, Cells
The association between violence and mental health in adolescent girls: rural-urban differences

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Poor mental health accounts for a large proportion of the disease burden in young people in all societies and it is strongly related to other health and developmental concerns in young people. Exposure to community and personal violence may increase the risk of poor mental health. The aim of this study is to compare the differences in the association between violence and mental health in adolescent girls from rural and urban communities. Data from the Birth to Twenty Plus and Ntshembo studies was used to estimate the prevalence of psychological distress and violence in urban and rural communities respectively. Using regression models, we determined the association between mental health and personal violence, adjusting for other individual, household and community characteristics. 32% of the urban girls and 17% of the rural girls showed psychological distress and 23% vs 14% reported experiencing personal violence respectively. The unadjusted odds of having psychological distress was approximately 1.8 times higher in girls who experienced personal violence compared to those who didn’t in both communities. Adjusting for household stressful events and socio-economic status reduced the odds to OR 1.6 (95% CI 1.01-2.67; p-value <0.05) in the urban adolescents and to 1.3 (0.63-2.79; p-value >0.05) in the rural girls, indicating the possible mediating role of the household factors. Both rural and urban girls who experience personal violence are at risk of experiencing psychological distress and household factors seem to play a significant role in this association.

Key words: Violence, mental health, adolescents, rural-urban
DL-P-7

Which Indexes of Aortic Function Best Add to Brachial Pulse Pressure Associations with End-Organ Changes Independent of Pulse Wave Velocity in a Group of African Ancestry?


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There is increasing evidence that several indices of aortic function add to cardiovascular risk prediction. However, those indices that add to rather than replace brachial pulse pressure (PP) associations with cardiovascular end-organ measures independent of aortic pulse wave velocity (PWV) are uncertain. In 1197 community participants of African ancestry we assessed aortic function using radial applanation tonometry and end-organ changes from echocardiography (left ventricular mass index [LVMI]) (n=812), carotid ultrasound (intima-media thickness [n=622]) and estimated glomerular filtration rate (n=1178). Central aortic PP (PPc), 1/aortic-to-brachial PP amplification (PPamp), aortic backward wave pressure (Pb), and aortic reflection magnitude (RM=Pb/forward wave pressure), but neither aortic augmented pressures (Pa), nor index (AIx) were associated with all end-organ measures independent of brachial PP. In multivariate models with the inclusion of PPc or Pb and brachial PP; PPc or Pb replaced brachial PP in relations with end-organ measures or the presence of LV hypertrophy or chronic kidney disease, but added little to the models. In contrast, with the inclusion of brachial PP and 1/PPamp or RM in multivariate models, brachial PP-end-organ relations were retained, whilst 1/PPamp (p<0.0005) and RM (p<0.01 to <0.0001) further added to the models. Relations between 1/PPamp or RM and end-organ changes remained unchanged with adjustments for PWV. In conclusion, 1/PP amplification and the reflected (backward) wave magnitude (RM), but not PPc, Pb, Pa, or AIx add to brachial PP associations with end-organ measures and these effects are independent of aortic PWV.

Key words: Pulse, Pressure, Amplification
A retrospective study investigating the efficacy of a 12 week exercise programme in men and women with low back pain in Gauteng

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Low back pain (LBP) is a world-wide occurring health problem. It is said to be related to a loss in quality of life as well as a disruption in activities of daily living. In developed countries, approximately 70% of the population suffer from LBP. Among the healthy population alone in South Africa, it is estimated that 35.8% of the population experience LBP. To assess whether an exercise programme, that is participated in for 12 weeks, will decrease the amount of pain experienced as well as improve postural and pelvic stability in those who suffer from low back pain. A retrospective analysis was employed to investigate the effects a 12 week LBP exercise programme had in 10 participants (age: 59.2 ± 8.26 years). Pain was assessed using an Oswestry pain questionnaire, postural stability was assessed using a Biodex Balance SD system and pelvic stability was assessed using a step-down and Trendelenburg test. The intervention included 12 weeks of biweekly exercise which occurred in 60 minute bouts. Exercises included retraining of the core stabiliser muscles as well as general core muscle strengthening and general conditioning. Exercises were modified/adapted for each individual to ensure optimal exercise benefit. None of the subjects showed improvements in all variables, yet, an improvement in three of the variables were found in 40% of subjects, an improvement in two variables was found in 30% of subjects and an improvement in a single variable was found in 30% of subjects. Overall most participants improved in reducing the amount of pain experienced, followed by an improvement pelvic stability. However there was a decline in postural stability in all except for 2 participants, yet this was not statistically significant. It can therefore be stated that the exercise intervention had a beneficial effect on all the subjects that participated in the study. Exercise as an intervention is cost effective and has the potential to specifically improve the pain experienced with low back pain. Due to uniqueness of all people, some individuals may respond better to exercise than others.

Key words: Exercise programme, low back pain
Multicolour flow cytometry for studying immune parameters that differentiate different phases of acute pancreatitis

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Multicolour flow cytometry is a powerful means of characterizing immune cells at the single cell level in one experiment. By using this technique multiple epitopes on a single cell can be detected to phenotype immune cells at a fine level e.g., memory versus naïve phenotype. Multicolour flow cytometry has been used extensively in HIV/AIDS studies over the last decade to characterize changes in immune cells during the course of disease, in treatment with HAART and to identify T cell subsets predictive of progression to AIDS. These studies and others highlight the diverse scientific questions that have been addressed in HIV immunology using flow cytometry. To date no study has employed multicolour flow cytometry to assess immune cells in acute pancreatitis (AP), an inflammatory disease of the pancreas commonly caused by alcohol abuse. Given the immense data generated by flow cytometry experiments, such a study will provide insights into the complexity of the immune responses taking place during the course of AP. This data would be correlated with clinical outcomes of patients, and potentially open avenues for immunomodulation research in AP. The findings will also provide information on the management of AP, mitigating the often fatal outcome from associated complications. Preliminary findings looking at cytokine production between AP patients of different severities showed that the systemic response is polarized towards a Th17 rather than a Th1 cytokine response, requiring further exploration.

Key words: Acute pancreatitis, flow cytometry, stages, prognosis
Left Ventricular Diastolic Dysfunction is Associated with Aortic Backward Wave Pressure, but not Stiffness in a Predominantly Young-to-Middle Aged Community Sample.

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There are limited proven therapies for heart failure with a preserved ejection fraction hence identifying the mechanisms responsible is of importance. Central to the pathogenesis are increases in aortic stiffness and enhanced aortic backward waves which produce diastolic dysfunction (DD). Whether the impact of backward wave pressures on left ventricular (LV) DD antedates the effects of aortic stiffness is uncertain. Therefore, we compared the relative contribution of various aortic hemodynamic parameters to preclinical DD in a predominantly young-to-middle aged community-based sample. In 524 randomly selected participants of African ancestry we assessed central aortic pulse pressure (PPc), forward wave pressure (Pf), backward wave pressure (Pb), augmented pressure (Pa) and aortic pulse wave velocity (PWV). LV mass index (LVMI), early to late trans-mitral velocity (E/A) and E/velocity of myocardial tissue lengthening (E/e') were determined using echocardiography. Independent of confounders including LVMI; PPc (p<0.002), Pb (p<0.0005), Pa (p<0.002), and Pf (p<0.02), but not PWV were independently associated with E/e' (but not with E/A). With adjustments for confounders, PPc (p<0.005), Pb (p<0.002) and Pa (p<0.001), but not Pf or PWV were independently associated with E/e' ≥12 (moderate-to-severe DD, n=69). The independent relations between PPc and E/e’ or moderate-to-severe DD were not affected by adjustments for PWV, or Pf, but were abolished with adjustments for Pb. In conclusion, in a predominantly young-to-middle aged community sample, the impact of backward wave pressures on LV DD antedates the effects of aortic stiffness.

Key words: Aortic function, left ventricular diastolic function, backward waves
The influence of maternal risk exposure during pregnancy and the first year of life on early childhood linear growth in urban South African children

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Linear growth is one of the most sensitive indicators of early childhood health and well-being. This study aimed to determine the effects of maternal risk exposures during pregnancy and the first year of a child's life on linear growth and stunting at age two years in an urban South African longitudinal birth cohort. The analytical sample for this study included 1098 mother-infant pairs from the Birth to Twenty Plus cohort in Soweto, Johannesburg, who had data at all relevant time points for this study. Twenty-two percent of children were stunted at two years, with the odds of being stunted 1.5 times higher among males than females (OR = 1.50; 95% CI: 1.07, 2.10). Infants of single mothers had a 0.34 lower HAZ (95% CI: -0.57, -0.11). Socio-economic status was a significant determinant of linear growth and stunting for males; with males in higher SES quintiles having an approximately 60% decreased likelihood of being stunted. Higher maternal education was associated with increased linear growth and decreased likelihood of stunting among females. This study reaffirms that there are particular factors that influence children’s linear growth and vulnerability to stunting for males and females. It highlights the importance of the psychosocial and environmental contexts of the mother and infant during pregnancy and the first two years of life. Public health programmes should place greater emphasis on addressing these needs in the ‘first 1000 days’ to protect young children from growth faltering in the earliest years of life.

Key words: Growth, Stunting, Gender, South Africa, Infancy