Latest PAT Publications

**Angiopoietin-2 is increased in sepsis and inversely associated with nitric oxide-dependent microvascular reactivity.**


Tested endothelial NO bioavailability, vascular endothelial growth factor (VEGF), endothelial-active cytokines and EndoPAT index correlations with ang-2 concentrations in sepsis, (n = 83 early sepsis vs. 41 hospital controls).

**Results:** Plasma Ang-2 increased with sepsis severity (P < 0.0001), and correlated inversely with EndoPAT index (r = -0.38, P < 0.0001), positively with IL-6 (r = 0.57, P < 0.0001) and degree of organ failure (r = 0.58, P < 0.0001). Longitudinal recovery of EndoPAT index was associated with decline in ang-2.

**Conclusions:** Ang-2 is proportional to sepsis severity, and inversely correlated to EndoPAT index. Impaired NO bioavailability may contribute to increased release of ang-2, endothelial activation and capillary leakage. Agents increasing NO bioavailability may have therapeutic potential in sepsis.


**Postprandial vascular reactivity in obese and normal weight young adults.**


Compared vascular reactivity after a high-fat meal in 11 obese (median BMI 46.4, age 32.1 ±6.3 years, 7 men) and 11 normal weight (median BMI 22.6) age- and sex-matched controls. Physiological parameters and blood chemistry were measured at baseline and 1 and 3 h postmeal.

**Results:** At baseline, obese subjects had higher systolic BP, HR, resting FBF, insulin and equivalent FMD, EndoPAT index, hyperemic FBF, AIx75, PWV(b), glucose, total cholesterol, triglycerides, and lower HDL cholesterol. FMD at baseline and 3 h was not significantly different between groups, nor did the meal produce significant changes in EndoPAT index, hyperemic FBF, and PWV(b) in either group.

**Conclusions:** Vascular responses to a high-fat meal are similar in obese and normal weight young adults, and thus unlikely to contribute importantly to the increased cardiovascular risk of obesity.


**Asymmetric dimethylarginine, endothelial nitric oxide bioavailability and mortality in sepsis.**


Assessed Plasma concentrations of asymmetric dimethylarginine (ADMA), L-arginine concentrations and EndoPAT index in 98 patients, 67 with acute sepsis, and 31 controls.

**Results:** Baseline plasma L-arginine: ADMA ratio was significantly lower in sepsis (median [IQR] 63 [45-103]) than controls (143 [123-166], p<0.0001) and correlated with EndoPAT index (r = 0.34, p = 0.02). Increase in ADMA correlated with increase in organ failure and decrease in EndoPAT index.

**Conclusions:** Impaired endothelial and microvascular function due to decreased endothelial NO bioavailability is a potential mechanism linking increased plasma ADMA to organ failure and death in sepsis.


**Comparing EndoPAT and BIOPAC measurement of vascular responses to mental stress.**


Compared stress-induced changes in vascular function during acute mental stress tests using the EndoPAT2000, to a standard polygraph device (BIOPAC MP150), in 25 healthy subjects. Reactive hyperemia was compared at baseline and following three acute mental stress tests using both methods.

**Results:** There was no difference in vascular hyperemic reactivity at baseline and following acute mental stress, as measured by both systems (P >0.05), however, mental stress ratios measured by EndoPAT were significantly different than those measured by BIOPAC (P < 0.01).

**Conclusions:** Data suggest that EndoPAT measurements of vascular responses to acute mental stress may be more specific and sensitive than measurements using the BIOPAC system.

Dietary, lifestyle and pharmacogenetic factors associated with arteriole endothelial-dependent vasodilatation in schizophrenia patients treated with atypical antipsychotics (AAPs).

A spontaneous, double-blind, double-dummy cross-over study on the effects of daily vardenafil on arterial stiffness in patients with vasculogenic erectile dysfunction.

Remission is the goal for cardiovascular risk management in patients with rheumatoid arthritis: a cross-sectional comparative study.

Normal Endothelial Function in Patients with Mild-to-Moderate Psoriasis: A Case-control Study.

Measured endothelial function (EndoPAT2000), and other cardiovascular risk factors in patients with mild-to-moderate psoriasis (n = 30) and controls (n = 30).

Results: No difference in endothelial function between groups, but the patient group exhibited higher levels of certain cardiovascular risk factors compared to controls

Conclusions: Even mild-to-moderate psoriasis may be regarded as a systemic inflammatory disease, with an increased cardiovascular risk in the long-term.

Measured the effects of vardenafil on endothelial function and arterial stiffness in men with erectile dysfunction (ED, N=20) enrolled in a 4-week, randomized, double-blind, double-dummy, crossover study of either daily vardenafil 10mg or 20mg on-demand with a two-week washout interval. EndoPAT index, AI, endothelial blood markers and ED questionnaire were assessed.

Results: Patients who took daily vardenafil (vs. on-demand) had significant improvements in arterial stiffness as evaluated by the EndoPAT AI (P<0.01), and reduction of plasma ADM levels (p<0.05). Each treatment resulted in significantly greater IIEF5 scores (p<0.001).

Conclusions: Daily vardenafil improves arterial stiffness and erectile function measurements in men with severe vasculogenic ED.


Compared cardiovascular disease (CVD) risk markers amongst patients with rheumatoid arthritis (RA), either active or in remission (N=113), and controls (N=66). A panel of biomarkers, EndoPAT index, pressure measurements, arterial stiffness and intima-media thickness were compared.

Results: Active RA had significantly higher levels of NT-proBNP, brachial systolic pressure, augmentation index and central systolic pressure but lower cholesterol than the other 2 groups. Active RA patients also had significantly higher pulse wave velocity and worse EndoPAT index than RA patients in remission.

Conclusions: Only Patients with active RA, had significantly increased levels of CVD risk markers, thus linking inflammatory activity to markers of CVD risk in patients with RA and indirectly supporting the notion that remission in RA confers diminished cardiovascular morbidity.

Examined endothelial function (EndoPAT Index) in schizophrenic patients (n=83), and determined association with pharmacogenetic, medication, dietary, and lifestyle factors. Subjects were screened for metabolic syndrome, physical activity, smoking, variants related to folate pharmacogenetics, and the influence of N-3 FA dietary intake.

Results: EndoPAT Index was positively related to N-3 FA intake (F=17.7(1,16), p<0.0007) in subjects not receiving atypical antipsychotics (AAPs), but not in those treated with AAPs (F=0.25(1,43), p<0.6). Regression analysis confirmed the interaction effect of AAP treatment on the relationship between EndoPAT Index and N-3 FAs (p=0.0105). Endothelial dysfunction was also related to folate pharmacogenetic variants.

Conclusions: AAPs may counteract some vascular health benefits of a diet high in N-3 FAs. Pharmacogenetic variants related to folate and homocysteine metabolism may also increase endothelial dysfunction risk.
Assessed the impact of hyperaldosteronism on EPC (endothelial progenitor cells) function and vascularization capacity in mice and humans.

**Results:** Treatment of human EPC with aldosterone induced impaired multiple cellular functions of EPCs. Aldosterone infusion in mice impaired EPC function, EPC homing to vascular structures and vascularization capacity. Endothelial progenitor cells from patients with primary hyperaldosteronism compared with controls of similar age displayed reduced migratory potential. Impaired EPC function was associated with endothelial dysfunction assessed by the EndoPAT2000. MR (mineralocorticoid receptor) blockade in patients with hyperaldosteronism improved EPC function and arterial stiffness assessed by EndoPAT2000.

**Conclusions:** Normalization of EPC function may represent a novel mechanism contributing to the beneficial effects of MR blockade in cardiovascular disease prevention and treatment.

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December 1 - 4, 2011
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American Academy of Anti-Aging Medicine
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Spotlight on
Prof. David Celermajer

David Celermajer, MB BS, PhD, DSc, is the Scandrett Professor of Cardiology, University of Sydney, and the Director of Echocardiography and Cardiologist, Royal Prince Alfred Hospital. Clinical Director of the Heart Research Institute, Sydney, and Chairman of the Research Committee, National Heart Foundation of Australia.

His principle research interest is in early detection of vascular disease and specifically in endothelial function assessment, cellular/molecular biology, animal models of heart disease, public health research, and developing world research. In 1992, when in John Deanfield’s lab he published the first description of the Flow Mediated Dilatation technique for non-invasive endothelial function assessment.

Prof. Celermajer and colleagues, are making significant contributions to the scientific base and clinical acceptance of the EndoPAT, as evidenced by the following publications:


Yeo TW, Lampah DA, Gitawati R, Tjitra E, Kenangalem E, Piera K, Price RN, Duffull SB, Celermajer DS, Anstey NM. Angiopoietin-2 is associated with decreased endothelial nitric oxide and poor clinical outcome in severe falciparum malaria. PNAS 2008 Nov 4;105(44):17097-102


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