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C. Palombo, N. Guraschi, C. Morizzo, G. Bini, M. Kozakova

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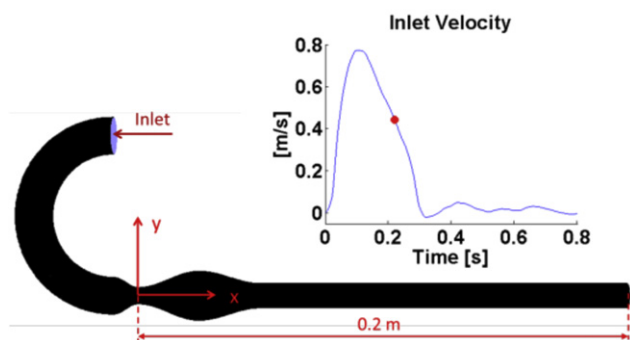


Figure 1 Geometry with flow direction and inlet pulse profile.

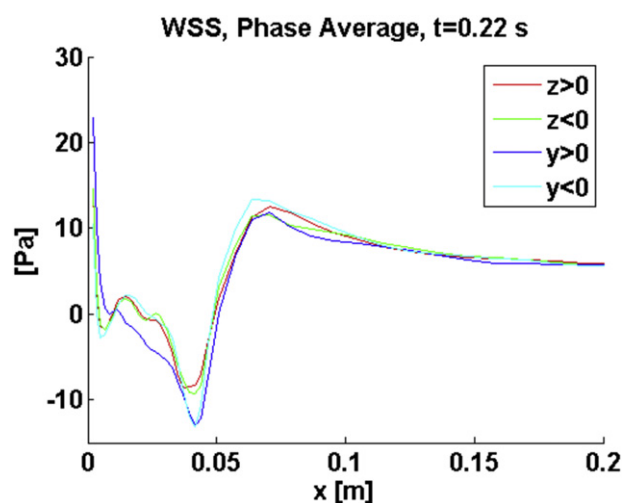


Figure 2 Phase averaged axial WSS along four lines between the throat ($x=0$) and the exit ($x=0.2$ m).

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P2.06

RETINAL PULSE WAVE VELOCITY ASSESSMENT FOR IN-VIVO ESTIMATION OF MICROCIRCULATORY ARTERIAL STIFFNESS IN MEDICALLY VALIDATED HEALTHY VOLUNTEERS

K. Kotliar ^{1,2}, M. Baumann ², A. Djimandjaja ², I. Lanzl ³, M. Halle ⁴, U. Heemann ², A. Schmidt-Trucksäss ⁵

¹Institute of Micro Technology and Medical Device Technology (MIMED), Technische Universität München, München, Germany

²Department of Nephrology, Technische Universität München, München, Germany

³Department of Ophthalmology, Technische Universität München, München, Germany

⁴Department of Preventive Sports Medicine, Technische Universität München, München, Germany

⁵Division of Sports Medicine, University of Basel, Basel, Switzerland

A novel clinical methodology is proposed, which characterizes in-vivo arterial stiffness in the central microcirculation. Pulse wave propagation in retinal arteries is assessed and a parameter "retinal pulse-wave velocity" (rPWV) is calculated. We demonstrated previously that both aging with not excluded cardiovascular risk factors and mild arterial hypertension are associated with elevated rPWV. Whether rPWV increases with age in a cohort of medically

validated healthy subjects is investigated. 71 healthy 41.0±12.1 (range: 20 – 66) years old volunteers were examined. The following cardiovascular risk factors were excluded: overweight, increased blood pressure, cholesterol level and blood glucose. Time dependent alterations of vessel diameter were assessed by the Dynamic Vessel Analyzer in a segment of a retinal artery. The data was filtered and evaluated by methods of mathematical signal analysis in order to obtain rPWV value. rPWV amounted to 370±100 (range: 180 – 620) units/second in the whole group (units correspond to μm in the Gullstrand's eye model). In the cohort rPWV increased with age (Pearson's correlation: $r=0.41$, $p<0.005$) to 21 units/second per a decade. rPWV showed weak correlations with vessel diameter: $r=-0.27$, $p<0.05$ and mean arterial pressure: $r=0.22$, $p<0.05$. Thus healthy aging with excluded mentioned cardiovascular risk factors is associated with a flat increase of rPWV and hence with age-related elevation of retinal arterial stiffness. This rPWV alteration and absolute rPWV values in medically validated volunteers allow to distinguish this cohort well from young hypertensives (1620±1310 units/second) or aged subjects with not excluded cardiovascular risk (1200±520 units/second) reported in our previous studies.

P2.07

CENTRAL HEMODYNAMIC ESTIMATES BY ULTRASOUND-DERIVED CAROTID DISTENSION WAVEFORMS: COMPARISON WITH APPLANATION TONOMOMETRY

C. Palombo ¹, N. Guraschi ², C. Morizzo ¹, G. Bini ¹, M. Kozakova ^{1,2}

¹University of Pisa, Pisa, Italy

²Esaote SpA, Genova, Italy

Background: new commercially available radiofrequency (RF) based ultrasound (US) allows accurate depiction of common carotid (CCA) distension waveforms, whereas carotid applanation tonometry represents a validated technique for pressure waveform description. From both distension and pressure waveforms local carotid pressure and some hemodynamic indices, such as Left Ventricular Ejection Time (LVET), are obtained. Aim of this study was to validate estimates of local CCA pressure and LVET by ultrasound distension waveforms against applanation tonometry.

Methods: in 112 subjects (66 males; mean age 56.2±9.9; 16 non diabetic non hypertensive, NL; 34 hypertensives, HT; 62 diabetics, DM), right CCA distension waveforms were obtained by RF-based wall tracking of the near and far wall (MyLab70, Esaote). Afterwards, CCA pressure waveforms were recorded by applanation tonometry (Pulsepen, Diatecne). Local systolic, diastolic and pulse pressure were derived calibrating both waveforms for brachial pressure (Omron) as previously described (Van Bortel LM et al, *J Hypertens* 2001). LVET was also evaluated with both systems.

Results: brachial SBP and PP were 137.0±17.1 and 57.4±13.9 mmHg, significantly higher ($p<0.001$) than those recorded by tonometry or US. Brachial DBP was 79.6 ± 8.9 mmHg. US-derived SBP, DBP and PP were slightly but significantly higher than tonometric values, while LVET was lower (see Table).

Method	SBP (mmHg)	DBP (mmHg)	PP (mmHg)	LVET (ms)
Tonometry	121.3±15.8	77.9±9.2	43.5±13.1	317±27
Ultrasound	126.6±16.6**	79.6±8.7**	46.9±13.8**	297±25**

** : $p<0.01$ for US vs Tonometry.

However, corresponding measures obtained with the two techniques were well correlated (r values from 0.754 and 0.896, $p<0.001$). In Bland-Altman analysis, the outliers were between 4 and 6 for each parameter.

Conclusions: RF-US allows accurate estimate of central BP and LVET.

P2.08

CENTRAL-TO-PERIPHERAL BLOOD PRESSURE AMPLIFICATION: INVASIVE VALIDATION OF TWO DEVICES (SPHYGMOCOR AND OMRON HEM9000AI)

G. Pucci ¹, F. Battista ¹, S. Notaristefano ², C. Cavallini ², E. Mannarino ³, G. Schillaci ¹

¹Unit of Internal Medicine, University of Perugia, Terni, Italy

²Cardiology Department, Perugia Hospital, Perugia, Italy

³Internal Medicine, Angiology and Atherosclerotic Diseases, University of Perugia, Perugia, Italy

Introduction: central-to-peripheral systolic blood pressure (SBP) and pulse pressure (PP) amplification (SBP-amp, PP-amp) are independent