Age and Gender Influence the Haemodynamic Response to the Active Orthostatic Test

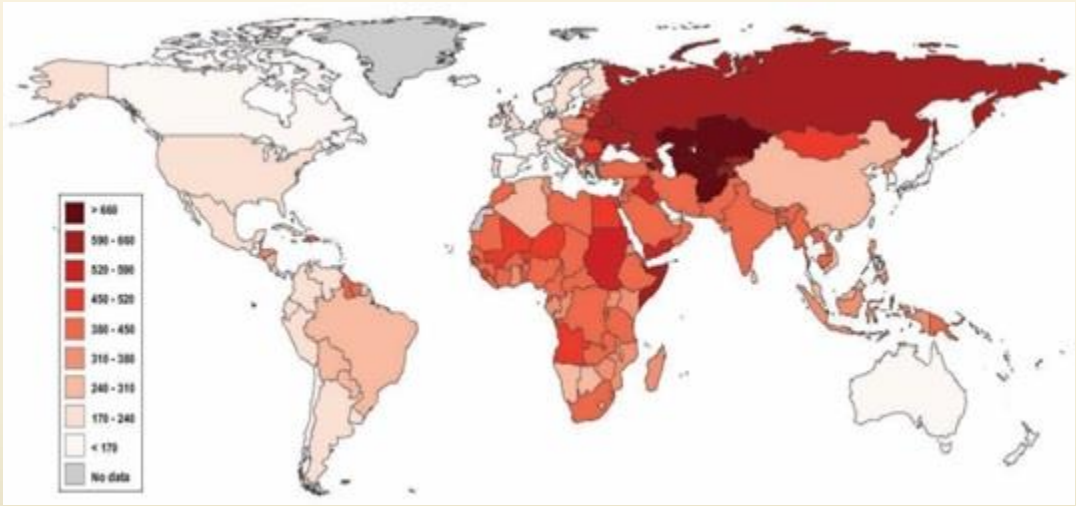
Belova N., Mileva-Popova R.
Department of Physiology, Medical University of Sofia

Primary prevention of CVD is based on screening for individuals at higher risk.

Cardiovascular risk factors

- **Non-modifiable: age**, gender, ethnic, genetic

- **Modifiable:** hypertension, metabolic disturbances, low physical activity, unhealthy diet, noxious habits, stress.



It is predicted that by 2020 CVD will exceed non-communicable diseases ***as the world's leading cause of death and impaired quality of life***. A large part of the global CVD impact is ascribed to economic, social, and cultural changes that have led ***to increases in risk factors for CVD***.

Levenson et al., Prev Cardiol. 2002; 5: 188-99.

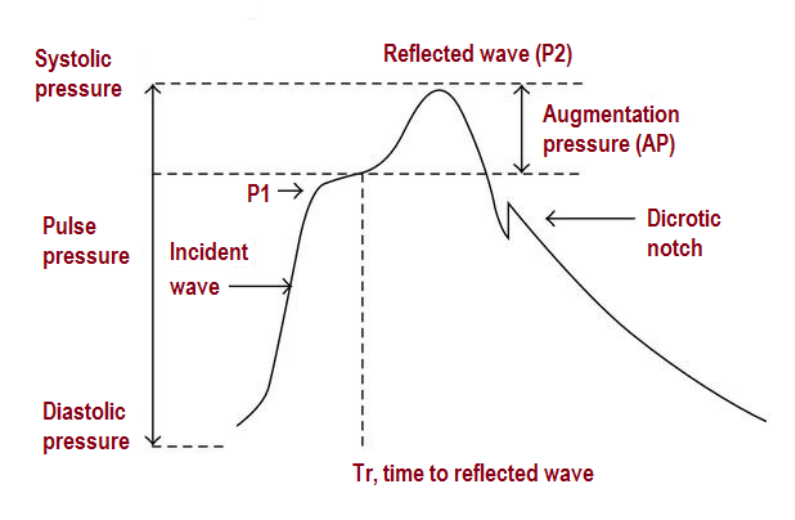
Arterial stiffness is assumed to be an intermediate cardiovascular endpoint as being a composite measure of the impact of various harmful influences on the vascular wall (Cunha et al., 2017)

The aim of our study was to examine the age- and gender-related differences in the haemodynamic response to the active orthostatic test (AOT).

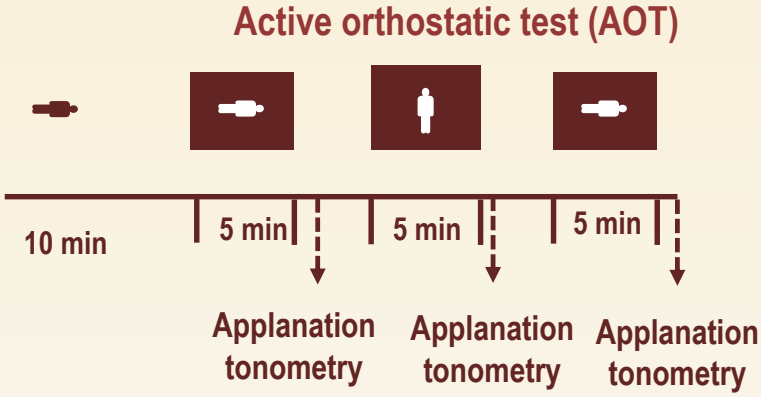
Materials and methods:

64 individuals				
Groups	YM	YF	MAM	MAF
Number	18	14	12	20
Age	22±1	20±1	47±3	57±2
BMI (kg/m^2)	24±1	21±1	29±1$^{\#\#,*}$	27±1$^{\#\#}$

Pulse wave analysis (PWA)



Experimental protocol



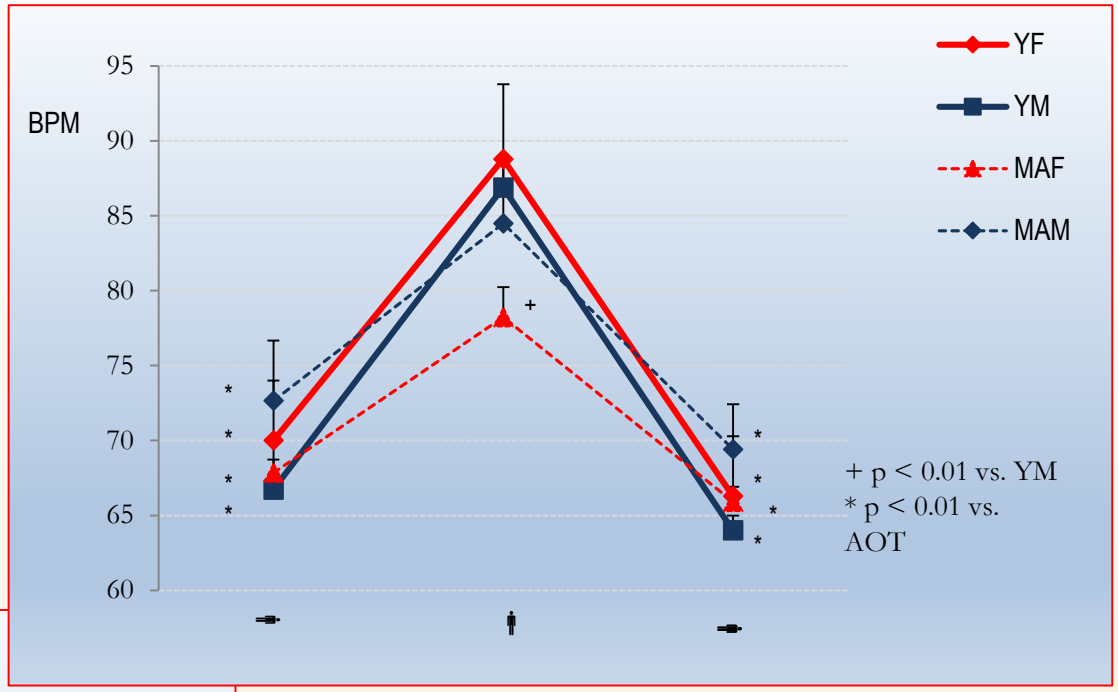
SphygmoCor (AtCor Medical, Sidney, Australia)

PWA parameters:

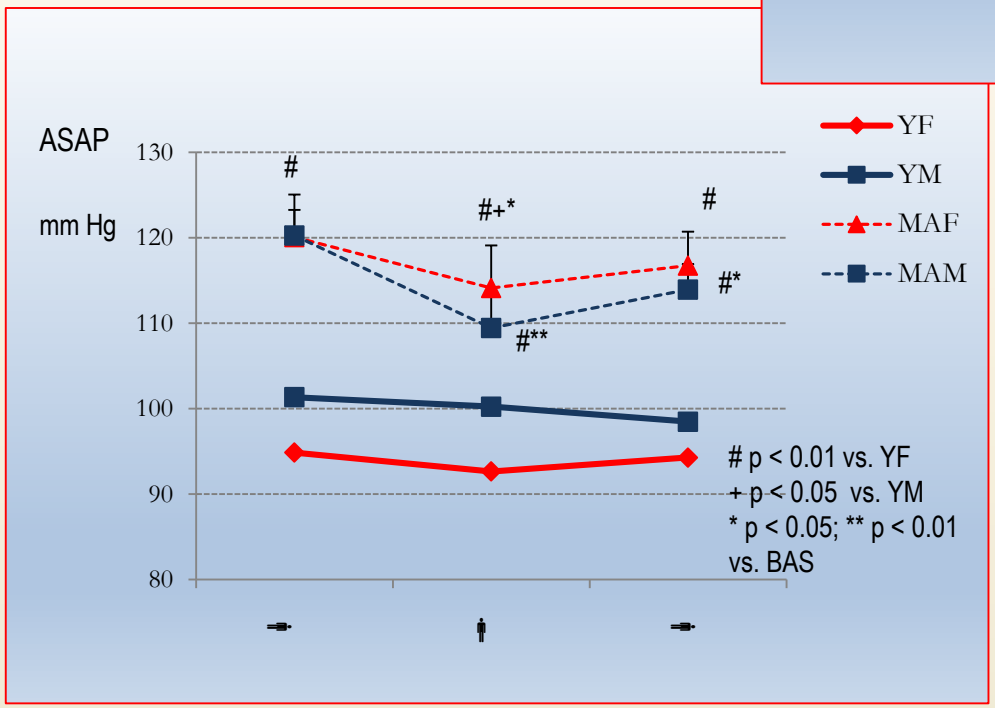
1. Aortic pressures.
2. Augmentation index (AIx) and AIx75 (corrected for heart rate 75 bpm)

$$AIx = \frac{Augmentation\ pressure}{Pulse\ pressure} \times 100\%$$

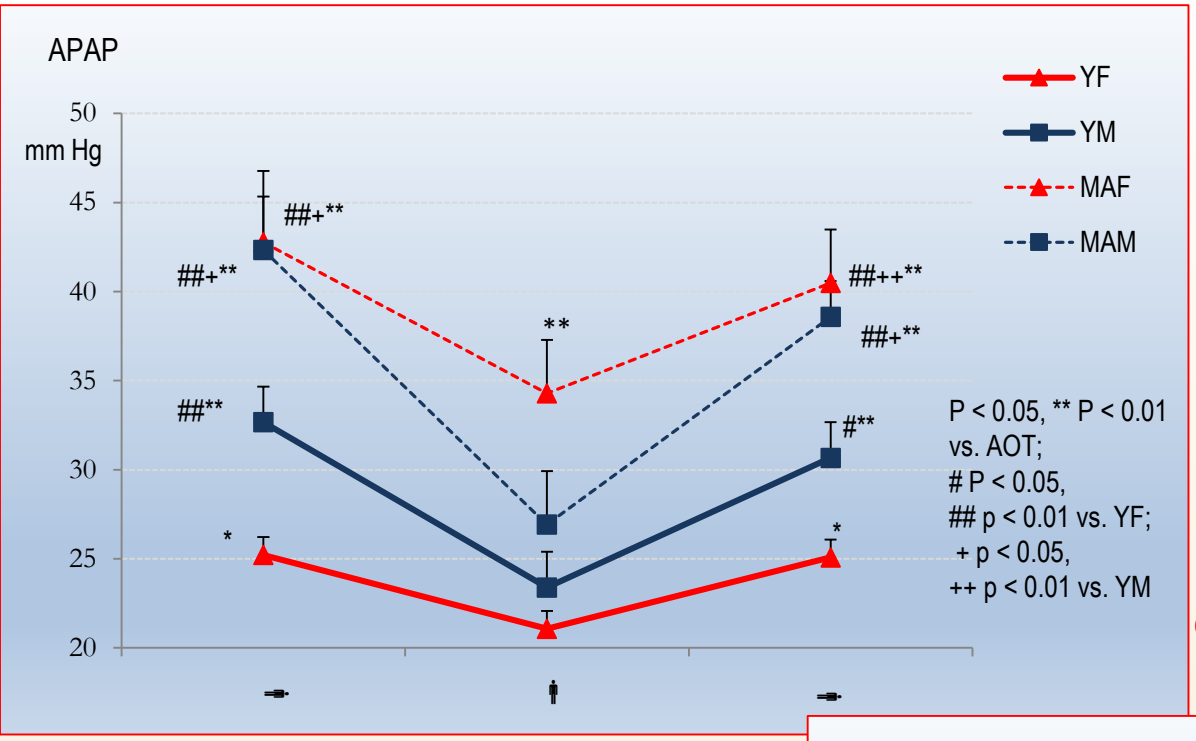
Heart rate dynamics in response to the AOT: age and gender dependence



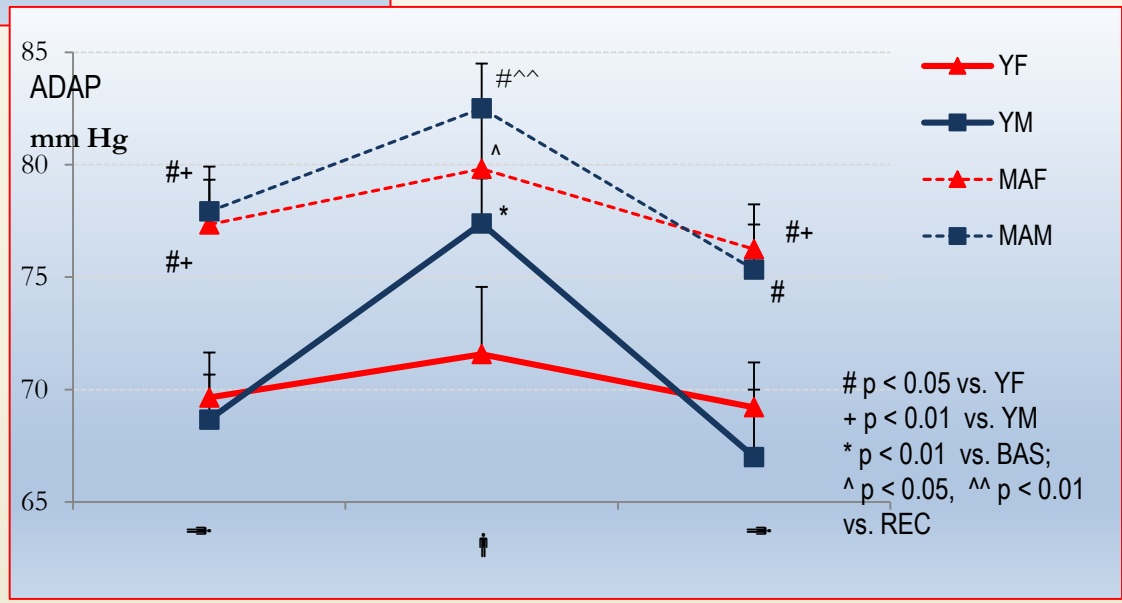
Aortic systolic arterial pressure (ASAP) dynamics in response to the AOT: age- and gender-dependence



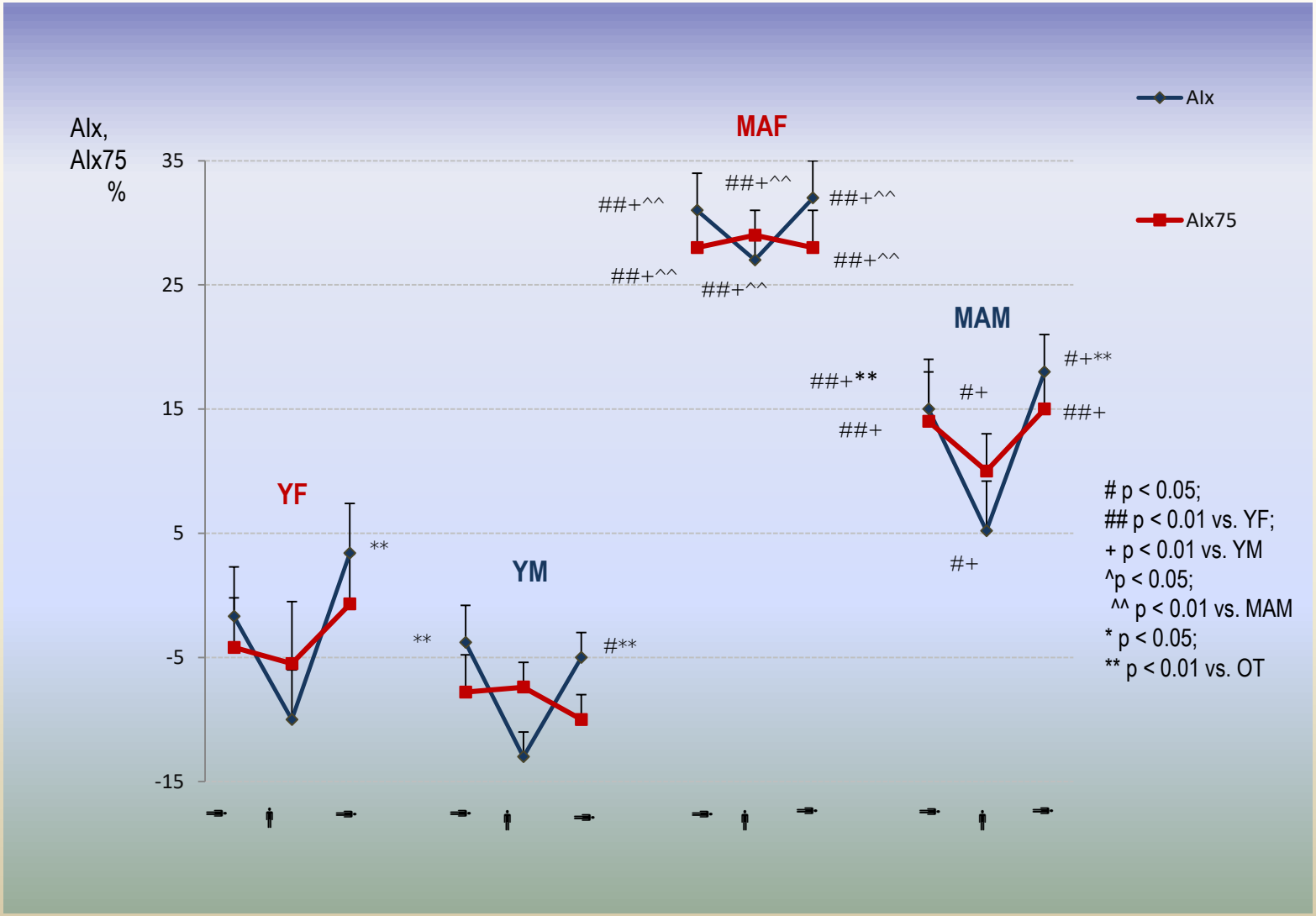
Aortic pulse pressure (APAP) dynamics in response to the AOT: age and gender dependence

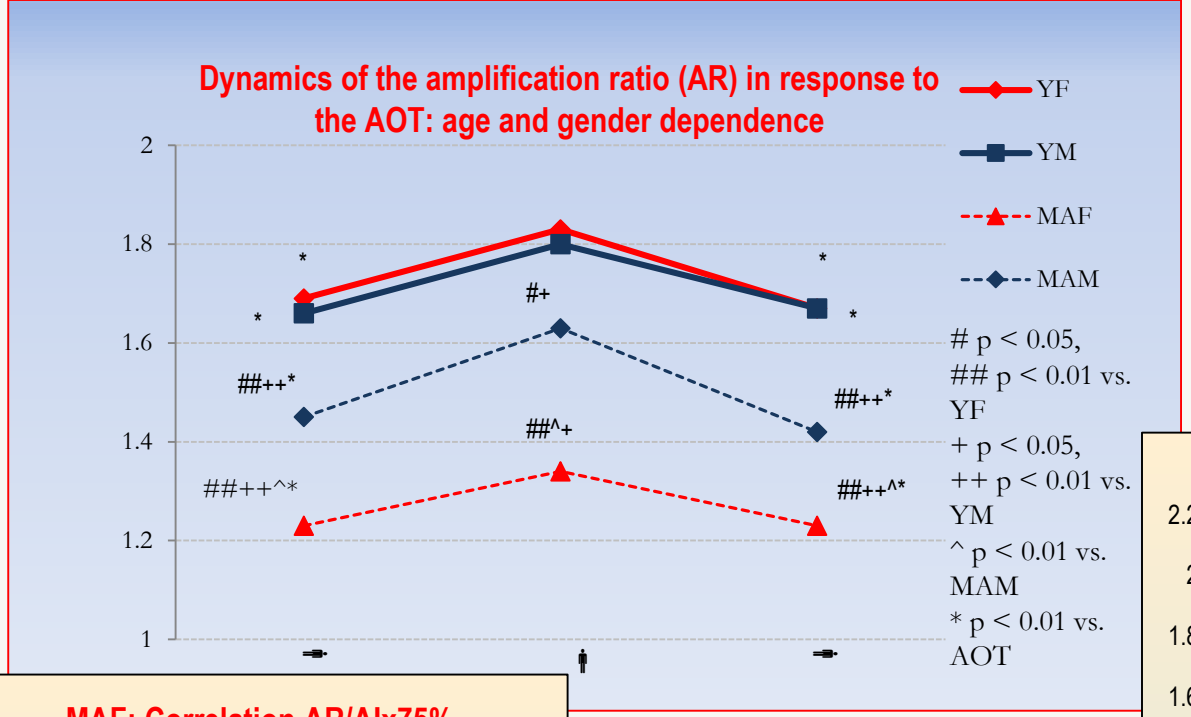


Aortic diastolic arterial pressure (ADAP) dynamics in response to the AOT: age and gender dependence

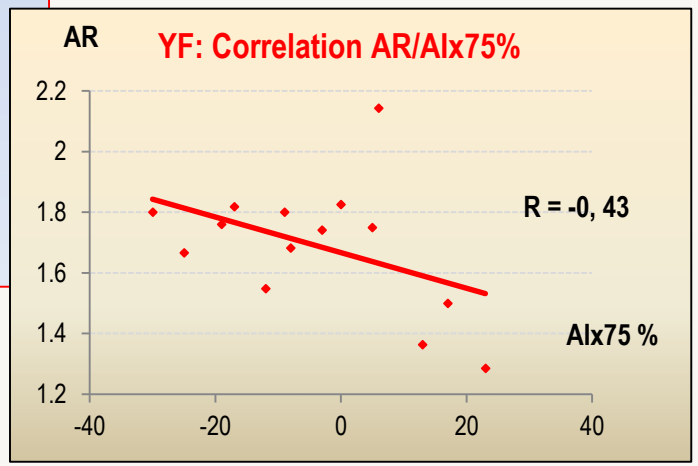


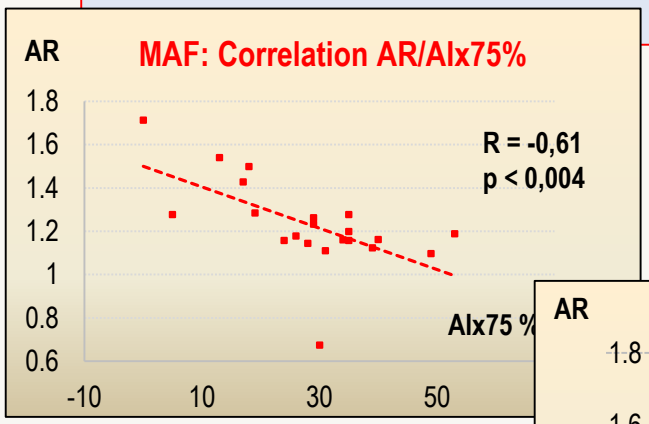
Dynamics of the augmentation indices AIx and AIx75 in response to the AOT

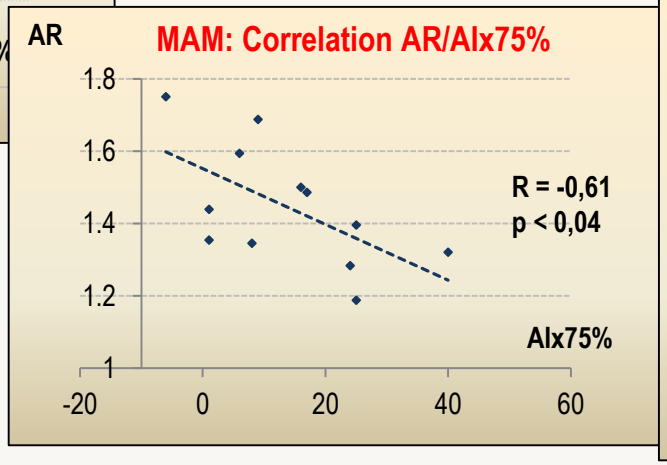


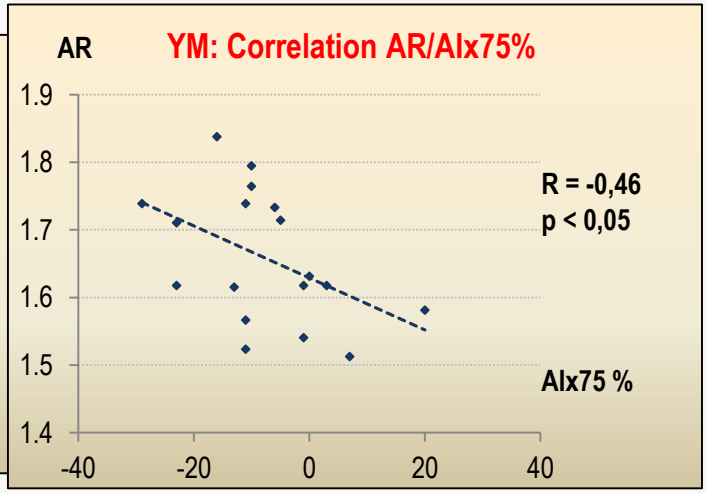


$$AR = \frac{Radial\ pulse\ pressure}{Aortic\ pulse\ pressure}$$









Conclusions

1. We have presented convincing evidence for the development of arterial stiffness in the older individuals – significantly higher resting central systolic and diastolic pressures, augmentation indices and lower amplification ratio.
2. We have shown age and gender specific differences in the hemodynamic response to the active orthostatic test:
   - ✓ Middle aged persons responded to the AOT with lesser heart rate elevation as compared to the young individuals, the change being lowest in the MAF;
   - ✓ Middle aged persons responded to the AOT with more pronounced reduction of the central systolic and pulse pressures, this reduction being highest in the MAM;
   - ✓ Middle aged persons responded to the AOT with lesser diastolic pressure elevation, females showing lesser diastolic pressure elevation than males;
   - ✓ The above data might be interpreted as a less efficient baroreflex response in the older individuals due to the decreased arterial baroreceptor sensitivity;
   - ✓ The dissociation between the changes in AIx% and practically the lack of changes in AIx75% in response to OT suggested that no acute modification of arterial stiffness occurred in response to the AOT.

Thank you for your attention

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