LETTERS TO THE EDITOR

Aortic Stiffness Formula

To the Editor:
Aortic stiffness was reported to be a predictor of cardiovascular morbidity and mortality. It was shown that aortic stiffness increases in patients with hypertension, diabetes mellitus, diastolic dysfunction, and coronary artery disease.1 The aortic stiffness index can be calculated using the following formula: ln (SBP/DBP)/(AoS – AoD)/AoD where SBP is systolic blood pressure, DBP is diastolic blood pressure, AoS is systolic diameter of the ascending aorta, and AoD is the diastolic diameter of the ascending aorta.2–5

We read with great enthusiasm the recent study of Protogerou et al, entitled “Pressure Wave Reflections, Central Blood Pressure, and Aortic Stiffness in Patients With Adamantiades-Behçet’s Disease: A Cross-Sectional Case-Control Study Underlining the Role of Chronic Corticosteroid Treatment.”6 Protogerou et al demonstrated that the augmentation index, but not aortic stiffness, is lower in patients with Adamantiades-Behçet’s disease who take corticosteroids, compared with patients not taking corticosteroids and similar to a control group. They concluded that their results imply a role of inflammation or immunomodulatory mechanisms in the regulation of pressure-wave reflections, and that chronic use of corticosteroids is independently associated with the presence of reduced pressure-wave reflections, but not with aortic stiffness.

The formula used by Protogerou et al6 to calculate aortic stiffness was taken from Ikonomokis et al.7 There is an erratum in the formula for obtaining aortic stiffness index in this cited article. The formula “Aortic stiffness index = ln (SBP/DBP) × (AoS – AoD)/AoD” should have read, “Aortic stiffness index = ln (SBP/DBP)/(AoS – AoD)/AoD.”8

We think that the authors should reevaluate their findings, because their aortic stiffness index was obtained via an incorrect formula. Using the correct formula to calculate the aortic stiffness index will lead to more accurate and reliable findings.

MEHMET GUNGOR KAYA
IBRAHIM OZDOGRU
TUGRUL INANC
ALI DOGAN
Department of Cardiology
Erciyes University School of Medicine
Kayseri, Turkey
doi:10.1016/j.amjhyper.2007.02.007

References

Pressure-Wave Reflections, Local Aortic Stiffness, and Corticosteroid Use in Adamantiades-Behçet’s Disease

To the Editor:
We thank Dr. Kaya et al for their comments on our recent work regarding the effect of corticosteroids on pressure-wave reflections and central blood pressure in patients with Adamantiades-Behçet’s disease (ABD).1 New findings of this study were: (1) that pressure-wave reflections are increased in patients with ABD, compared with a control group, and (2) that the chronic use of corticosteroids was related to lower pressure-wave reflections and thus central blood pressure. On the other hand, we did not observe a similar association with local aortic stiffness. We also previously showed that local aortic stiffness is increased in patients with ABD, compared with a control group.2 Together, these two results imply the presence of a beneficial site-specific action of corticosteroids in the peripheral microcirculation. We thank kayon et al3 for their observation concerning a typographical erratum in the formula used for the calculation of aortic stiffness.
index in our previous study. This was also addressed in a Correction in the *Journal of the American College of Cardiology.* In the study published in the *American Journal of Hypertension,* the formula used for the calculation of the (nonlogarithmically transformed) aortic stiffness index was: \( \frac{\ln(SBP/DBP)}{[(\text{AoS} - \text{AoD})/\text{AoD}]} \) (please see Table 1 for abbreviations). In Table 1, we present all other indices of local aortic stiffness previously used, as well as their linear correlation with the index presented in Protogerou et al. It is clear that there is no effect of corticosteroids on any index of local aortic stiffness, and that they are all very closely correlated with the one we used. In this respect, we believe that our article is accurate and scientifically reliable.

ATHANASE PROTOGEROU
JOHN LEKAKIS
IGNATOS IKONOMIDIS
KIMON STAMATELOPOULOS
KOSTAS AZNAOURIDIS
EMMANOUEL KARATZIS
CHRISTOS PAPAMICHAEL
NIKOLAOS MARKOMIHAKIS
PHEDON KAKLAMANIS
MYRON MAVRIKAKIS

Department of Medical Therapeutics
Alexandra Hospital
University of Athens
Athens, Greece
doi:10.1016/j.amjhyper.2007.02.005

Address correspondence and reprint requests to Dr. Athanasios Dimitrios Protogerou, Department of Medical Therapeutics, Alexandra Hospital, University of Athens, 4 Argyroupoleos Street, 11471 Athens, Greece; e-mail: aprotog@med.uoa.gr

References


### Table 1. Indices of local aortic stiffness

<table>
<thead>
<tr>
<th>Arterial stiffness indices</th>
<th>ABD on corticosteroids (mean values ± SD)</th>
<th>ABD without corticosteroids (mean values ± SD)</th>
<th>Linear correlation with aortic stiffness index used by Protogerou et al.¹ (pearson correlation coefficient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ao stiffness index: ( \ln(SBP/DBP)/[(\text{AoS} - \text{AoD})/\text{AoD}] )</td>
<td>16.0 ± 12.5</td>
<td>15.3 ± 9.1</td>
<td>0.951*</td>
</tr>
<tr>
<td>Ao strain (%): ( 100 \times [(\text{AoS} - \text{AoD})/\text{AoD}] )</td>
<td>4.0 ± 0.6</td>
<td>3.9 ± 0.5</td>
<td>−0.720*</td>
</tr>
<tr>
<td>( \text{Ep} ) ( \left( \text{cm}^2 \times \text{dyn}^{-1} \times 10^{-6} \right) : \frac{\text{PP}}{[(\text{AoS} - \text{AoD})/\text{AoD}] }</td>
<td>1.18 ± 0.92</td>
<td>1.15 ± 0.71</td>
<td>0.934*</td>
</tr>
<tr>
<td>( 2 \times [(\text{AoS} - \text{AoD})/(\text{AoD}/\text{PP})] )</td>
<td>1.5 ± 1.1</td>
<td>1.4 ± 1.0</td>
<td>−0.682</td>
</tr>
</tbody>
</table>

\( \text{Ao} = \) aortic; \( \text{AoD} = \) aorta diastolic diameter; \( \text{AoS} = \) aorta systolic diameter; \( \text{DBP} = \) diastolic blood pressure; \( \text{Ep} = \) aortic pressure strain modulus; \( \text{PP} = \) pulse pressure; \( \text{SBP} = \) systolic blood pressure.

* \( P < .001. \) No differences were observed in any of the stiffness indices between subjects with and without corticosteroids.