Letter to the Editor

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Resistance to Blood Flow at Maximal Vasodilation

The following letter is in response to a Letter to the Editor that appeared in Hypertension 1988;12:635–637

Professor Folkow1 questioned some of the methods used in our study2 and cast doubts on our conclusions. We will comment here on the methodology only and leave it to the reader to draw conclusions from the data published.

1. Data variations. It is not correct to claim that “the very lowest as well as the highest maximal flow values in . . . [our] normotensive group are so far beyond what is ordinarily seen in normal human forearms.” Similar variations of blood flow and minimal resistance after 10 minutes of ischemia have been found by Amery et al3 in normotensive individuals (29.6–101.3 ml/min/100 ml tissue). Unfortunately, other groups did not indicate the range, but the standard deviations were similar to those observed in our study.4–6

2. Overlap of blood pressure values. Folkow points out that in our study mean arterial blood pressure (MAP) values after “maximal” vasodilation overlap considerably, while there was hardly any overlap of MAP between his hypertensive and normotensive groups.7 However, the overlap in our study was due to the fact that the blood pressure in the hypertensive patients as well as in the normotensive subjects declined substantially after maximal vasodilator maneuvers (by 17% and 12%, respectively) so that blood pressures of five out of 21 hypertensive patients fell into the normotensive range. This is in accordance with data by Hulthén et al.8 The fall in blood pressure after vasodilator maneuvers obviously has been missed by Folkow et al,9 because they did not measure the blood pressure directly in the experimental arm during vasodilation. It is clearly an advantage that we have recorded the blood pressure directly in our study, thereby detecting changes in blood pressure during vasodilator maneuvers. The fall in blood pressure again speaks in favor of an important functional component of the elevated resistance in hypertensive individuals.

3. Statistical analysis. As detailed in our study,2 we have chosen a univariate approach by comparison of carefully selected matched pairs, which is recognized as a valid method of analyzing such data. When we analyzed our data as suggested by Folkow,1 although resting blood pressure values did not form a continuum, we obtained a weak but significant correlation between mean arterial pressure and resistance at maximal dilation (r=0.363; p<0.05). However, this would mean that only about 13% of the variance could be attributed to a structural component (since at higher blood pressures minimal forearm resistance to blood flow at maximal dilatation [Rmin] was higher) and about 87% had to be ascribed to other mechanisms, (i.e., to some functional component). In conclusion, we believe that at least part of the differences between Professor Folkow’s data and ours is due to the different methodologies used. We believe that our methodology (direct blood pressure measurement and additional administration of a calcium entry blocker beside ischemia to produce “maximal” vasodilation) was valid.

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References

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