Increasing evidence suggests that arterial hypertension (AHT) may begin in childhood and result in the premature development of cardiovascular disease. In view of this, we believed it would be important to investigate the early vascular changes related to early hypertension at the micro- and macrovascular levels both under normal circumstances and after cold-induced sympathetic stimulation. In a cohort of 121 adolescent subjects, we measured peripheral and central blood pressure (pBP and cBP, respectively), pulse pressure (PP), and the augmentation index (AIx), as well as retinal vascular diameters, at baseline and during a cold pressor test (CPT). We measured the central retinal arteriolar equivalent (CRAE) and central retinal venular equivalent (CRVE) and calculated the retinal arteriolar-to-venular ratio (AVR). We compared macro- and microvascular alterations among normotensive (NT), prehypertensive (PHT), and hypertensive (HT) adolescents. Of the adolescent subjects in the study, 54.5% were NT, 25.6% were PHT, and 19.8% were HT. With regard to BMI, central systolic BP (cSBP), aortic pulse pressure (AoPP), and CRAE, the PHT adolescents had values similar to those in the HT group but significantly different than those in the NT group. In the studied population, there was a positive and significant correlation of
Alx with cSBP and a negative association of CRAE with both cSBP and peripheral SBP (pSBP). We describe the evolution of these parameters during and after sympathetic stimulation. As compared with the prevalence of hypertension and prehypertension in large studies, involving teenagers and children, an alarming percentage (45.5%) of the adolescents in our study were HT or PHT. Higher pSBP and cSBP were associated with narrower retinal arterioles but not with changes of arterial elasticity. With particular regard to CRAE, the PHT group was more closely related to the HT group than to the NT group. There were no differences among the NT, PHT, and HT groups in the results of the CPT.