

# Age dependency in the timing of mitral annular motion in relation to ventricular filling in healthy subjects: Umea General Population Heart Study

## Abstract:

AIMS: Peak left ventricular (LV) relaxation normally precedes peak filling (E), which supports the hypothesis that LV suction contributes to early-diastolic filling. The significance of similar temporal discordance in late diastole has previously not been studied. We describe the time relationships between mitral annular motion and LV filling in early and late diastole and examine the effect of normal ageing on these time intervals. METHODS AND RESULTS: A total of 128 healthy subjects aged 25-88 years were studied. Transmitral and pulmonary venous flow reversals (Ar) were recorded by Doppler echocardiography. Mitral annular diastolic displacement-early (E(m)) and late (A(m))-were recorded by Doppler tissue imaging. With reference to electrocardiographic R and P-waves, the following measurements were made: R to peak E-wave (R-E) and E(m) (R-E(m)); onset P to peak A-wave (P-pA), A(m) (P-pA(m)), and Ar (P-pAr). The differences between [(R-E) and (R-E(m))] for early-diastolic temporal discordance (EDTD) and [(P-A) and (P-A(m))] for late-diastolic temporal discordance (LDTD) were calculated. Isovolumic relaxation time (IVRT) was also measured. Early-diastolic temporal discordance was approximately 26 ms in all age groups. Late-diastolic temporal discordance, however, was inversely related to age ( $r = -0.35$ ,  $P < 0.001$ ) and IVRT ( $r = -0.34$ ,  $P < 0.001$ ) and therefore decreased in the elderly vs. young ( $13 \pm 10$  vs.  $23 \pm 10$  ms;  $P < 0.001$ ). In multivariate analysis, age failed to predict LDTD in the presence of IVRT. A, A(m), and Ar were simultaneous at onset, and peak A(m) coincided with peak Ar in all age groups ( $r = 0.97$ ,  $P < 0.001$ ). No significant differences were noted in the RR intervals. CONCLUSIONS: Sequential prolongation of IVRT with ageing reduces LDTD, thus converging the peaks of A(m), A, and Ar (atrial mechanical alignment)-a potential novel method to identify subjects at increased dependency on atrial contraction for late-diastolic filling.