**Chendi Yang**

**2017 Chendi Yang--****An Assessment of Coherent Plane-Wave Compounding Ultrasonography(超声波检查法) Applied to Detect t****he Common Carotid Artery Wall(颈总动脉壁 )with** **the Three-Membrane Structure**

**Purpose:** As one of the most precise predictors for assessment of potential atherosclerosis to prevent future cardiovascular and cerebrovascular diseases in the medical diagnosis, changes in three-membrane structure (3MS) of common carotid artery (CCA) wall and related dynamic features have a high clinical relevance. However, the standard ultrasonography (SU),a common technique to measure the thicknesses of the membranes of CCA walls and related dynamic parameters,scans objects by focused beam transmissions line-by-line. The limited number of focus causes vessel wall imaging to be discontinuous and fuzzy in the regions outside the focus.Thus the measurement accuracy and reliability for diagnosis indices based on the images are degraded.

**Methods:** In present study, we propose to use the coherent plane-wave compounding ultrasonography (CPCU) for scanning the CCA wall with 3MS to improve the detection performance. A 3D scatterer model of CCA with 3MS is established to simulate SU and CPCU-based B-mode images by using ultrasound simulation platform.The thicknesses of intima, media and adventitia of the CCA wall are segmented from B-mode images by using the threshold method, respectively.

**Results:** Results based on 30 sets of simulations show that the measurement accuracies for the thicknesses of three membrane structure based on the CPCU and the SU are not significantly different, but the effective detection ratio of segmentation from images based on CPCU is 12% higher than that based on SU.