Purpose: In order to determine the optimal prescan delay for CT pulmonary angiography (CTPA), pulmonary circulation time images can be acquired at the anatomical level of main pulmonary artery prior to the main CTPA. The purpose of this abstract is to demonstrate cardiac output can also be calculated from the preparatory CT series.

Methods: The single slice pulmonary circulation time images were acquired on a GE CT scanner once per second in cine mode during infusion (5 cc/sec) of contrast (a blend of 25 cc Omnipaque and 50 cc saline), followed by a 30 cc saline bolus. The single slice CT series, covering superior vena cava, pulmonary artery, ascending aorta (AA) and descending aorta (DA) as in Fig A, were imported into the in-house software to obtain time series at both AA and DA, as well as the essential geometrical info needed for determining the volume of aortic arch.

The time series at DA, which is the downstream measurement of AA, was assumed equivalent to the mathematically convoluted time series of AA with a certain delay function. Considering the fast nature of flow in the aorta, an exponential delay function with the delay time constant, i.e. \((1/d)\times\exp(-t/d)\), was assumed (ref 1 for exponential dispersion in fast flow).

The delay time constant, which is the average time span between the cross sections of AA and DA, was determined by the least square error fitting while comparing the measured DA time series to the varying degree of convoluted time series of AA. The volume of the aortic arch and delay time constant were then used to calculate the cardiac output.

Results and conclusion: The cardiac output values for two subjects were 4.97 and 3.63 L/min, which are in good agreement with the reference range of 1.9 to 11.6 L/min (ref 2).