



Comparison of Normal Ranges for Pulse Dynamic Hemodynamic Parameters Between US and Chinese Population

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Cardiovascular aging and abnormalities are genetic, lifestyle, diet dependent. Abnormal hemodynamic parameters are one of the primary indicators of cardiovascular disease and can be used for the clinical assessment of cardiac and arterial physiological conditions. Observation of changes to these indicators would provide an essential tool in cardiovascular risk assessment and disease management. Establishment of reference levels based on large scale studies of different ethnic groups would offer crucial baseline values for disease evaluation and management. Pulse Dynamics is a clinically validated non-invasive method to obtain hemodynamic measurements such as SBP, DBP, MAP, Pulse Pressure (PP), Heart Rate (HR), Cardiac Output (CO), and compliance by analysis of the oscillometric waveform of a cuff sphygmomanometer. Comparisons of normal ranges were made between a U.S. population sample (n = 2,464) of varying race and a Chinese population sample (n = 1,379). Both had age ranges from 18 to 80 years. Three successive measurements were recorded using DynaPulse monitors (Pulse Metric, Inc., San Diego) and averaged for each patient. Statistical analyses were made to the samples respectively based on genders and blood pressure status. Normotensive (NT) was defined as SBP<140 and DBP<90 (1,976 U.S., 994 Chinese). Differences and similarities of the measurement readings between the two population samples were compared and examined by Student's t-test on means adjusted by age. Normal ranges of the parameters (mean ± 2 SD) for U.S. and Chinese populations are:

	US (n = 1,976)						ASIA (n = 994)					
	Female (1,277)			Male (699)			Female (505)			Male (489)		
	Mean	SD	Normal Range	Mean	SD	Normal Range	Mean	SD	Normal Range	Mean	SD	Normal Range
SBP (mmHg)	118.0	10.86	96-140	123.90	9.32	105-142	120	12	95.9-139.2	123	10	105.3-142.6
DBP (mmHg)	66.1	6.98	52-80	68.53	7.42	53.7-83.4	68	8	52-79.9	70	8	53.7-83.3
MAP (mmHg)	82.6	7.69	67-98	85.32	7.61	70-100	85	9	67-97.8	87	8	70-100
PP (mmHg)	52.0	8.53	35-69	55.38	8.08	39-72	52	8	34.7-68.6	52	8	39.1-71.7
HR (BPM)	71.0	11.41	48-93	67.08	10.03	47-87	73	11	49-94.1	71	11	47-88
CO (L/min)	4.4	0.40	3.58-5.18	5.08	0.55	3.97-6.18	4.05	0.27	3.5-5.0	4.65	0.45	3.9-6.1

Results show that for normotensive population samples, Chinese male have significant elevation in means of SBP, DBP, MAP and HR against US population, while Chinese female showed significant lower in mean CO at the early age (<40). From middle age (40) to young elderly (65), such trends both for male and female continued except that the lowered mean of CO is observed among Chinese male. Finally, elderly (> 65) Chinese population remained lower mean of CO in both gender but significant higher in mean of SBP, DBP, MAP, and PP, in comparison with US population.

Keywords: hemodynamic, population norm