Y-H. LAI, L-Y. GUO. **A novel method for the assessment of the baroreflex sensitivity.** *Gerontechnology 2014; 13(2):230;* doi:10.4017/gt.2014.13.02.085.00 **Purpose** The evaluation of baroreflex sensitivity (BRS) is an assessment tool of autonomic control of the cardiovascular system. BRS might be a risk factor for several cardiovascular diseases[1]. The assessment of BRS was computed as the square root of the ratio between electrocardiographic (ECG) RR interval and systolic pressure (SBP) spectral components. However, it is not convenient to measure the dynamical SBP. In this study, we use Pulse Transit Time (PTT) as a surrogate signal of SBP to measure BRS[2]. **Method** The Physionet Fantasia Database is an archive of bio-signals for use by the research community[3]. We downloaded ten young (21-34) and ten elderly (68-85) healthy subjects' bio-signals . All participants had 120 minutes ECG and provided an uncalibrated continuous non-invasive blood pressure signal. Each heartbeat was annotated and the RR interval was then computed. PTT was definite from the intervals between ECG R peak and SBP waveforms peak (*Figure 1*). Traditionally, BRS and Coherence were computed in the 0.07–0.14Hz frequency range with following equation, where $POW_{RRI\_SBP}(f)$ is the cross power spectrum and $POW_{RRI}(f)$, $POW_{SBP}(f)$ mean the power spectrum of RRI and SBP.

$$BRS = \sqrt{\frac{POW_{RRI}(f)}{POW_{SBP}(f)}} \; ; \quad Coherence = \frac{\left|POW_{RRI\_SBP}(f)\right|^2}{POW_{RRI}(f) \times POW_{SBP}(f)}$$

Because the Fantasia database has only uncalibrated SBP signals, we used $POW_{PTT}(f)$ as a surrogate of $POW_{SBP}(f)$. **Results & Discussion** *Figure 2* is a scatter plot showing the distribution of individual BRS and Coherence values among the 20 subjects. Both BRS and Coherence were significantly lower in the elder group compared with young (BRS=6.36±4.19 vs. 13.48±5.14, respectively, P=0.0032; Coherence=0.2±0.06 vs. 0.4±0.08, respectively, p=0.0001). The age-related loss of BRS may reflect the degradation of integrated cardiovascular regulatory systems. This novel method not only reduces the difficult in measuring dynamical systolic pressure, but also has the potential application of evaluating the aging effect.

References

1. La Rovere MT, Pinna GD, Raczak G. Annals of Noninvasive Electrocardiology 2008;13(2):191-207; doi:10.1111/j.1542-474X.2008.00219.x.
2. Yoon Y, Cho JH, Yoon G. Journal of Medical Systems 2009;33(4):261-266; doi:10.1007/s10877-005-4300-z.9.
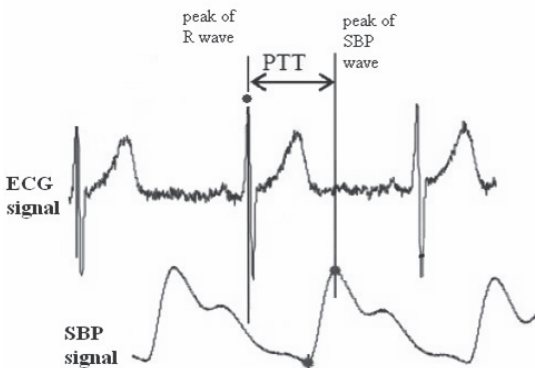3. Goldberger AL. Circulation 2000;101(23):E215-220; doi:10.1161/01.CIR.101.23.e215

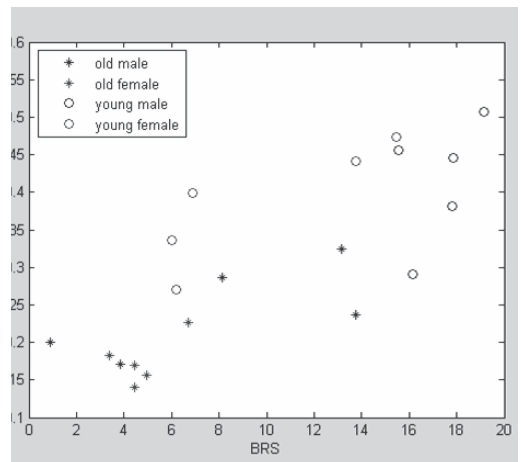Figure 1. The demo of pulse transit time (PTT)

Figure 2. Scatter plot of baroreflex sensitivity (BRS) and Coherence