*K.C. Hsieh, T.P. Tuan, C. Pei, C.S. Lin, W.M. Chi. Neural network, bioelectrical impedance and dual-energy x-ray absorptiometry in the assessment of body fat in elderly Taiwanese men. Gerontechnology 2008; 7(2):123.* This article applied a neural network model to the body fat assessment by Bioelectrical Impedance Analysis (BIA). According to the measured data obtained from BIA and Dual Energy X-ray Absorptiometry (DEXA) analysis and utilization an artificial neural network model theory for converging and calculation learning could obtain the network weight and bias coefficient. This investigation used the linear networks model which was different from network architecture. If input/target vector pairs were known we could directly minimize mean square to find the weights and biases[1]. Linear neural networks are mainly applied in self-adaptive filter design and signal predictions, composed of a layer of neurons with linear transfer function. It could apply to multiple input, multiple output and input delays etc. Generally speaking, the solving process was similar to designing a linear network, if the linear network could satisfy network weight for the given error. **Methods** This work studied a random group of 12 healthy Taiwanese men, aged from 60-70 yrs (mean age 65±3.6yrs, weight 73±6.8kg, height 166±5.9cm). Body weight was measured to the nearest 0.1 kg, with the subjects dressed in light clothing. Bare foot standing height was measured to the nearest 0.1 cm by using a wall-mounted stadiometer. Bioelectrical resistance(R) and reactance (Xc) were measured by a BIA analyzer (QuadScan4000) with four operating frequencies of 5, 50, 100, 200 kHz at 200μA. Furthermore, body compositions, e.g. fat mass, lean mass, and bone mineral content, measured from DEXA could be a gold standard. This investigation employed software Matlab7.0.1 to establish the neural network model for the prediction model. Finally, we compared with the results that prediction equations were based on linear regression proposed by Roubenoff et al[2]. **Results and discussion** This study uses root-mean-square (RMS) error to judge accuracy. The line drawn (y=x) means results obtained from linear regression/neural network prediction equal DEXA's measurement. The RMS of Figures1a and 1b respectively are 3.08 and 0.04. Therefore, the proposed method is more accurate than the linear regression prediction method.

**References**

1. Hagan MT, Demuth HB, BealeM. Neural Network Design. Boston: PWS; 1996
2. Roubenoff R, Baumgartner RN, Harris TB, Dallal GE, Hannan MT, Economos CD, Stauber PM, Wilson PW, Kiel DP. Journal of Gerontology 1997;52A:129-136

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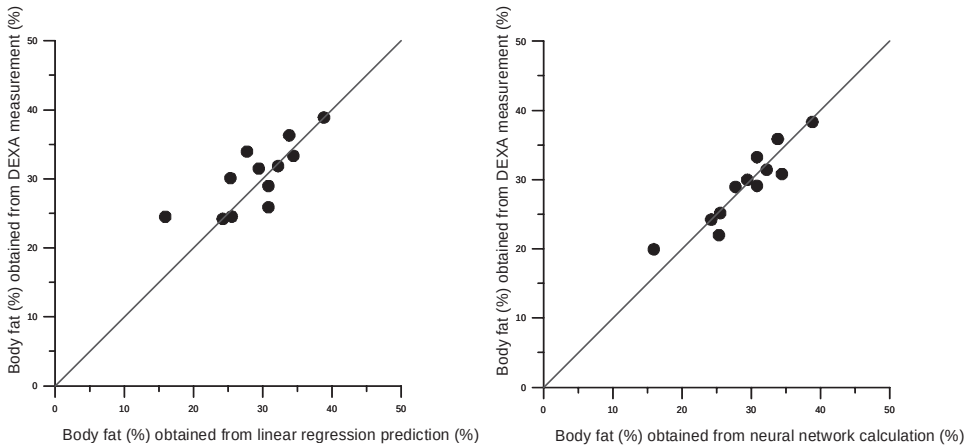


*Figure 1 Comparisons of body fat (%) measured from DEXA to calculated results from linear regression and linear neural network models*