Purpose:Artificial neural network to obtain two-dimensional dose distribution and of the linear accelerator Varian 2100C based on Monte Carlo calculations, MCNP5 code, were used. In this study we want to overcome the time consuming problem of Monte Carlo method in dose distribution calculation with the used artificial neural

Methods:Monte Carlo MCNP is employed to simulate a linear accelerator head , for calculation of dose distribution and the depth dose profile in water phantom. Dose profile obtained from the MCNP were validated using experimental data. Mesh tally card, fmesh4, with mesh dimension 0.5*0.5*0.5 cm^3 was overlaid on the water phantom with dimension 50*50*50cm^3 to calculate the photon dose distribution in phantom. This calculation used to train the artificial neural network (ANN) with MATLAB. Number of nodes and number of the iteration in neural network adjusted to optimize accuracy and speed. 70% of the MCNP data were used for training and the rest were employed for network verification.

Results:The evaluation of dose distribution of an unknown field size evaluated by ANN compared with MCNP simulation confirms the accuracy of the trained ANN. The dose distribution for the largest considered field size has a difference of less than 2% in the center and 5% in the edge of field size when compared with the MCNP calculation results.

Conclusions:
This study showed the ability of artificial neural network to calculate dose distribution in radiotherapy treatment planning. This method could be further developed for heterogeneous medium. The plan has the accuracy of Monte carlo and the speed is comparable with conventional practice in radiation oncology clinics..