ARTIFICIAL NEURAL NETWORKS IN THE PREDICTION OF LYMPHO VASCULAR INVASION IN PRIMARY BREAST CANCER

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Introduction:
• Lympho Vascular Invasion (LVI) as a prognostic marker in breast cancer
• Artificial Neural Networks (ANN) stepwise Multi Layer Perceptron (MLP) and Back Propagation (BP)
  – Robust, nonlinear and flexible
  – Can handle huge and complex datasets
  – Applications ranging from simple decision making to complex medical intervention determining in cancer

Objectives:
• To use stepwise ANN with MLP and BP to select highly correlating genes from genomic data
• To use in-house developed ANN to investigate interplaying genes governing LVI
• To decipher LVI pathway

Data Source:
• Nottingham Tenovus Primary Breast Carcinoma data
  ✓ 70 years and less women presented with stage I and II primary invasive breast carcinoma
  ✓ 128 frozen breast cancer samples from Nottingham Hospital NHS Trust Tumour Bank between 1986-1992, using Illumina Gene array with 47293 genes
**OVERVIEW**

**Introduction**

**Objectives**

**Data Source**

**Methodology**

**Results**

**Discussion**

**Conclusion**

**RESULTS**

- ANN was successful in differentiating closely related gene isoforms
- Weighted interactions resulted in clear directionality and influence of one gene’s expression on others showing positive and negative interactions
- In-house ANN interaction algorithm was helpful and elucidating pathway governing LVI in breast cancer
- Further validation with other pathway platforms and biological validation of pathway would be recommended.

**Discussion & Conclusion:**

- Interaction analysis model after 200 inputs