CATEGORICAL PREDICTION OF ACUTE CHEST PAIN OUTCOME BY RELONICS

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ABSTRACT

Relonics, for the first time, identifies previously unknown multi-dimensional patterns of biochemical meta-networks which can serve as specific and sensitive systemic markers for categorical prediction of acute chest pain outcome in individual patients at the time of admission in Intensive Care Unit.

To be useful, prognostic indicators must be highly specific, sufficiently sensitive, minimally intrusive and reasonably expensive. (Goldstein, Holmboe, 1999). According to the American Heart Association statistics in 1997 alone $10.8 billion was spent for the treatment of Coronary Hear Disease (http://www.americanheart).

However, $600 million of that enormous cost proved to be unnecessary: in 85% patients hospitalized with Acute Chest Pain, diagnosis of Acute Myocardial Infarction (AMI) was not confirmed (Ornato, 1999) because of lack of reliable prognostic indicators which could be used prior to hospital admission.

Categorical prediction is operationally defined as prognostic assessment of outcome for individual patient using three mutually exclusive categories: A) Definitive non-Fatal Outcome, B) Definitive Fatal Outcome or C) Uncertain Outcome (Kvitash, 2001).

For development of prediction patterns for categorical assessment of outcome from patients with Acute Chest Pain, quantitative information from 12 biochemical tests routinely used in clinical medicine for evaluation of metabolic processes in the human body were obtained for initial data base: Albumin, Calcium, Phosphorus, ASL (SGOT), Glucose, Alkaline Phosphotase, LDH, Total Bilirubin, BUN, Uric Acid, Cholesterol, and Total Protein in 82 consecutive patients were admitted to Intensive Care Unit with Acute Chest Pain to rule out Acute Myocardial Infarction (AMI).

In thirty-eight patients, diagnosis of AMI was ruled out and in forty-four patients, diagnosis of Acute Myocardial Infarction was confirmed. Thirty patients with AMI survived their catastrophic cardiac event and did not develop recurrent myocardial infarctions during the next 24 months of follow-up. Fourteen patients with confirmed AMI died within 48 hours from the onset of acute chest pain.

For eighty-two patients admitted to ICU, routine biochemical tests were obtained on admission. Patients were stratified by actual outcome into four clearly distinct groups:

1) Acute Myocardial Infarction with positive non-fatal outcome
2) Acute Myocardial Infarction with fatal outcome
3) Severe Angina
4) Non-Angina/Non-AMI.

Statistical analysis using two-tailed Student’s *t* test with significance level of *P*<0.05 demonstrated that routine biochemical variables by itself or in any combinations are absolutely useless for predicting outcome in patients with Acute Chest Pain.

The same useless numerical data points were reanalyzed by Relonics (Kvitash 2002) based on Balascopy - Systems-Specific Technology for multi-dimensional simultaneous assessment of relational quantitative, qualitative, and directional changes. (Kvitash, 1983; Kvitash, Kaufman 1985; Kvitash 1985, 1999, 2001). Then information from available initial biochemical data points was processed for relonic pattern mining and pattern cognition. Results are presented on the following pages as biochemical meta-networks.

Statistical evaluation of overall Relonics performance in categorical prediction of outcome of Acute Chest Pain demonstrated 92.9% sensitivity, 93.3% specificity, 86.7% accuracy for positive prediction, 96.6% accuracy for negative prediction, 6.7% false positive ratio, 7.1% false negative ratio and 93.2% accuracy in identification of patients with Acute Chest Pain who do not need to be admitted into the Intensive Care Unit.
In conclusion, practical application of Relonics for categorical individual prediction of Acute Chest Pain Outcome demonstrated the following significant advantages:

1) Relonics, for the first time, provided accurate and reliable identification of patients with Acute Chest Pain, therefore averting costly, unnecessary admittance into the Intensive Care Unit.

2) Relonics, for the first time, reliably identified previously unknown and even unsuspected highly ordered patterns of biochemical meta-networks strongly associated with different outcomes in patients with Acute Chest Pain.

3) Biochemical meta-networks can serve as reliable markers for definitive, categorical and individual prediction of Acute Chest Pain outcome.

4) Practical application of Relonics does not require employment of additional and expensive laboratory tests. It utilizes a battery of routine laboratory tests readily available in medical facilities.

5) Application of Relonics demonstrated the validity of Systems Sciences and Cybernetics approach in the resolution of current critical issues in clinical medicine.

REFERENCES


*Note: Proceedings reprints can be obtained from Dr. Kvitash*