BRIEF REPORTS

Possible contribution of advanced statistical methods (artificial neural networks and linear discriminant analysis) in recognition of patients with suspected atrophic body gastritis

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Abstract
AIM: Diagnosis of atrophic body gastritis (ABG) is based upon histological examinations of body mucosa biopsies obtained during gastroscopy. However, gastroscopy is invasive and expensive, and biopsy sampling of body mucosa prolongs the procedure increasing discomfort to the patient. Artificial neural networks (ANNs) and linear discriminant analysis (LDA) may be used as computer-based decision-support systems. Thus, this pilot study aimed at investigating whether ANNs and LDA could recognize patients with ABG in a database, containing only clinical and biochemical variables, of a pool of patients with and without ABG, by selecting the most predictive variables and by reducing input data to the minimum.

METHODS: Data was collected from 350 consecutive outpatients (263 with ABG, 87 with non-atrophic gastritis and/or celiac disease [controls]). Structured questionnaires with 22 items (anagraphic, anamnestic, clinical, and biochemical data) were filled out for each patient. All patients underwent gastroscopy with biopsies. ANNs and LDA were applied to recognize patients with ABG. Experiment 1: random selection on 37 variables, experiment 2: optimization process on 30 variables, experiment 3: input data reduction on 8 variables, experiment 4: use of only clinical input data on 5 variables, and experiment 5: use of only serological variables.

RESULTS: In experiment 1, overall accuracies of ANNs and LDA were 96.6% and 94.6%, respectively, for predicting patients with ABG. In experiment 2, ANNs and LDA reached an overall accuracy of 98.8% and 96%, respectively. In experiment 3, overall accuracy of ANNs was 98.4%. In experiment 4, overall accuracies of ANNs and LDA were, respectively, 91.3% and 88.6%. In experiment 5, overall accuracies of ANNs and LDA were, respectively, 97.7% and 94.4%.

CONCLUSION: This preliminary study suggests that advanced statistical methods, not only ANNs, but also LDA, may contribute to better address bioptic sampling during gastroscopy in a subset of patients in whom ABG may be suspected on the basis of aspecific gastrointestinal symptoms or non-digestive disorders.

Key words: Atrophic body gastritis; Computer-based decision support; Gastroscopy; Artificial neural networks