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CUT-OFF VALUES OF 123I-MIBG CARDIAC SCINTIGRAPHY DATA AS PROVIDED BY CLASSIFICATION TREE CLASSIFIER FOR THE DIFFERENTIAL DIAGNOSIS BETWEEN PARKINSON'S DISEASE AND PARKINSONISMS

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BACKGROUND-AIM

Considering the ability of a Random Forest Classifier (RF) to contribute to the differential diagnosis between Parkinson's disease (PD) and Parkinsonisms (P) by means of 123I-MIBG cardiac scintigraphy, we applied a further artificial neural network classifier, the classification tree (CIT), to test similar further data. CIT consists of a set of logical rules, organized as a decision tree to produce a clear classification of data, providing numerical cut-off values able to differentiate different clinical groups.

METHODS

123I-MIBG cardiac scintigraphy with semiquantitative analysis was performed by calculating early (at 15 min.) and delayed (at 4 hours) heart/mediastinum (H/M) tracer uptake ratios by the mean count density measurement in manually drawn ROIs in anterior view. We evaluated 106 patients, 61 males and 45 females, aged between 55 and 81years, 35 PD and 71 P. Concerning CIT for each of the 1,000 experiments performed, 11 patients were randomly selected as the training set, while the remaining 91 validated the trained CIT; the percentage of the validation data of the correctly classified patients was computed. The expected performance of an "average performance CIT" was evaluated.

RESULTS

For CIT, the probability of a correct classification in patients with PD was 90.05±9.20% (mean±SD) and in P patients 88.35±15.26%. For CIT, the decision rule gave a value for the early H/M ratio of 1.56±0.01. This means that patients with early H/M ratio values <1.56 were classified as PD subjects, while patients with early H/M ratio values >1.56 were classified as P subjects. In our study late H/M ratios did not add other significant information to the diagnostic classification.

CONCLUSION

The present study confirmed 123I-MIBG cardiac scintigraphy usefulness in movement disorder differential diagnosis. In particular, the results obtained demonstrated that the additional employment of CIT was similarly accurate as RF for this purpose and provided reliable and disease-specific numerical cutoff values able to differentiate between Parkinson's disease and Parkinsonisms. Furthermore, it is clinically relevant that early H/M ratio values alone allowed to obtain the final diagnosis, thus avoiding the necessity of further late scan.