

## Data mining analysis of serum trace elements in hospitalized patients supported by nutrition support team

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### Abstract

Recently, Nutrition Support Teams (NSTs) have been spreading throughout Japan. Nutritional assessment is important as an initial step among NST activities, since the patients can be identified based on this assessment whether they need supports by NST or not. Serum trace element is one of the most useful and convenient nutritional indices. The aim of this study is to analyze the relationships between serum trace element values and clinical backgrounds in NST patients by data mining.

The subjects of this study consisted of 29 NST patients who were admitted to our hospital between January 2005 and October 2006. Serum trace elements were analyzed by PIXE method in patients. The data were analyzed by a data mining software, i.e. "ICONS Miner" (Koden Industry Co., Ltd.). The significant "if-then rules" were extracted from the decision trees. The target variable of the decision trees is whether nutritional conditions of the patients are improved or not (Yes/No). The explanatory variables of the decision trees are the values in serum trace elements (Fe, Cu, Zn, Se, Mn) and TTR (transferrin). The analyses demonstrated that the first node of the decision tree was Zn. Therefore, serum Zn value might be the most significant factor among these trace elements in estimating the improvement of nutritional conditions of the patients. In the decision, the second branch was the Fe value, and the Cu the third. The following significant "If-then rules" were extracted from the decision trees.

#### *If-then rule 1:*

If serum Zn value  $>758.6 \mu\text{g/l}$ , then improvement of nutritional condition = Y. (1.00 = 9/9)

#### *If-then rule 2:*

If serum Zn value  $\leq 758.6 \mu\text{g/l}$  and Fe  $\leq 653.2 \mu\text{g/l}$  and Cu  $\leq 682.5 \mu\text{g/l}$ , then improvement of nutritional condition =

Y. (1.00 = 5/5)

*If-then rule 3:*

If serum Zn value  $\leq 758.6$   $\mu\text{g/l}$  and Fe  $\leq 653.2$   $\mu\text{g/l}$  and Cu  $> 682.5$   $\mu\text{g/l}$  and Se  $> 119.8$   $\mu\text{g/l}$ , then improvement of nutritional condition = Y. (1.00 = 3/3)

In conclusion, data mining analysis of serum trace elements was found to be an effective method in assessing the nutritional conditions in NST patients.