

USING MATHEMATICA 7 IN EVALUATION OF THYMIC EPITHELIAL TUMOURS PREDICTORS

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INTRODUCTION

Thymic Epithelial Tumours (TENs) are tumours of the thymus (a gland lies in the central chest area behind the breast bone). The function of the thymus gland is to produce specialised cells called T lymphocytes, which are part of the body's immune system to fight against infections. The thymus gland reaches its maximum development around puberty and then it gradually stops working and shrinks, being replaced by fat and scar tissue. TENs are rare tumours. Aim was to verify if exists a statistically significant difference and a correlation between 18 Fluorine Deoxy-Glucose Positron Emission Tomography and staging of TENs.

METHODS

Twenty-three patients were assessed by PET-CT before treatment. Maximum standardized uptake value (SUV_{max}) and tumour SUV_{max} /background mediastinal SUV_{max} ($SUV_{T/M}$) ratio were recorded. TENs were staged according to Masaoka, classified according to WHO, and divided in two groups: low-risk thymoma (LRT), A, AB and B; high-risk thymoma (HRT), B2, B3 and carcinoma.

Statistical Analysis

Two-tailed t-tests (normally distributed data) or Wilcoxon–Mann–Whitney U-test (not-normally distributed data) were used for evaluating significance of differences between groups means or medians. Significance of any proportional differences in attributes were evaluated using Fisher's Exact Test. Correlation between variables was evaluated using Bravais-Pearson linear correlation coefficient (r) and using Spearman rank correlation (r). Kendall's tau (τ) coefficient, a non-parametric statistic, was used to measure the association or statistical dependence between two measured quantities. Another non-parametric measure of correlation tested was Goodman – Kruskal Gamma (γ). We define as significant a $p < 0.05$, and as highly significant a $p < 0.01$. Interpretation of correlation was none ($r = 0.00 - 0.09$), small ($r = 0.1 - 0.3$), medium ($r = 0.3$ to 0.5), or large ($r = 0.5 - 1.0$). Statistical analysis was carried out using *Wolfram Mathematica 7*.

RESULTS

Stage of disease was: I (n=6), II (n=8), III (n=5), IV (n=4). Differences between means of SUV_{max} were statistically significant, but differences between means of $SUV_{T/M}$ were not statistically significant. Highly statistical correlation between SUV_{max} ($r=0.83$, $\tau=0.67$, $\gamma=0.74$), $SUV_{T/M}$ ($r=0.89$, $\tau=0.71$, $\gamma=0.72$) and stage of disease was found. WHO TENs distribution was: A (n=3); AB (n=5); B1 (n=4); B2 (n=2); B3 (n=2); C (n=7). Patients were divided respectively in LRT (n=12) and HRT (n=11). Despite small statistical sample differences between means of SUV_{max} were highly significant ($p<0.0001$) and between means of $SUV_{T/M}$ were highly significant ($p<0.0069$), and a correlation between SUV_{max} ($r=0.88$, $\tau=0.66$, $\gamma=0.83$) and $SUV_{T/M}$ ($r=0.91$, $\tau=0.79$, $\gamma=0.91$) was found.

CONCLUSION

$SUV_{T/M}$ is directly correlated to advanced stage of disease and higher degree of malignity of TENs. $SUV_{T/M}$ might be used to identify patient with HRT and could modify clinical management decisions.