Trial of Automatic Diagnosis of Scintigram by Use of Theory of Pattern Recognition (Application of Open Curve)

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A report was already submitted by us on the numerical expression of the outer shape of the liver scintigram by applying the theory of pattern recognition to the liver scintigram.

This theory was this time applied to the dynamic function curve in order to express numerically the open curve.

As the examination object, the renogram curve was expressed numerically and the study was conducted on whether or not the reval function could be recognized thereby.

In order to express the curve numerically, the theory of pattern recognition of Geschtalt psychology was utilized. A single figure was expressed by the function of radius. Then, Fourier descriptor was applied to acquire the power spectrum and further the Geschtalt value (G-value).

G-value of the respective types of renogram by Machida classification were obtained as follows: N-type 3.348, M_2-type 2.902, M_1-type 2.825 and L-type 3.174.

The result shows that G-value of L-type (function type) was similar to that of N-type (normal), while a correlation was observed between the G-values of M_2-type (delayed type) and M_1-type (obstructive type). G-values of the renogram were obtained as to 62 clinical cases (124 items). A correlation was observed between G-value and the renal function.

Conclusion:

The theory of pattern recognition was applied to the analysis of the renogram, thus to obtain G-value. This method was found useful in evaluating objectively the renogram and to establish the automatic diagnosis.

The information contained in the liver scintigram includes the shape, size, position, existence of space occupying lesion, the imaging balance of liver and other organs, etc. Among them, the shape belongs to the most objective factor.

Trial of Automatic Diagnosis of Scintigram by Use of Theory of Pattern Recognition (Application of Closed curve)

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In this study, we tried to express numerically the liver scintigram by means of the theory of pattern recognition and examined the possibility to apply the automatic diagnosis to the clinical cases.

For the numerical expression of the outer shape of the liver scintigram, the outer shape was expressed with the function of the composite prime number and was deployed by the Fourier descriptor. Furthermore, the power spectrum was prepared in order to obtain the Geschtalt value (G-value) by means of the entropy function.

90 cases of the liver scintigram were selected at random and their G-values were obtained.

In the liver cirrhosis cases, G-value showed a considerable distribution. However, a correlation was observed between the swelling degree of the liver lobe and the related G-value.

The numerical expression of the shape for the purpose of the automatic diagnosis becomes possible by obtaining G-value in the theory of pattern recognition of Geschtalt psychology.