LIEBIG PRINCIPLE MANIFESTS IN STRATIFICATION OF CANCER PATIENTS VIA COMPLETE BLOOD COUNT

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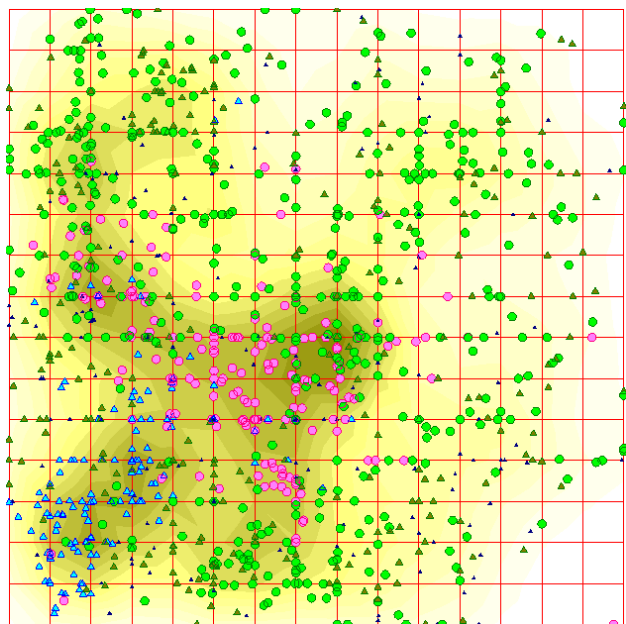

Figure 1: Distribution of patients over 16×16 elastic map.

Goal: Malignant neoplasms are among the key factors of mortality, worldwide. They are hard to detect and cure, as a rule. We aimed to reveal and describe the relation between various cancer tumors (including localization and the type) and the data of complete blood count (CBC).

Materials and Methods: The database comprises 867 patients suffering from various cancer diseases except the oncology of a blood system, itself. Each patient was characterized with 21 CBC character. To begin with, we calculated correlations between the characters, and excluded from the analysis some of them comprising highly correlated couples; eight highly correlated couples have been found.

Since linear statistics techniques failed to differentiate the patients with different nosologies, we implemented elastic map method. This method consists in approximation of multidimensional data with two-dimension manifold.

Results: We examined the databases comprising oncology patients (solely), conditionally healthy people (solely). and joint database (1270 entries, totally). Fig. 1 shows the distribution of patients for the joint database: rose circles are healthy women, blue triangles are healthy men, green circles are cancer women and dark green triangles are the sick men. On the contrary to healthy people, no correlation between the clusters observed over elastic map, and sex, age of cancer type has been observed for sick patients.
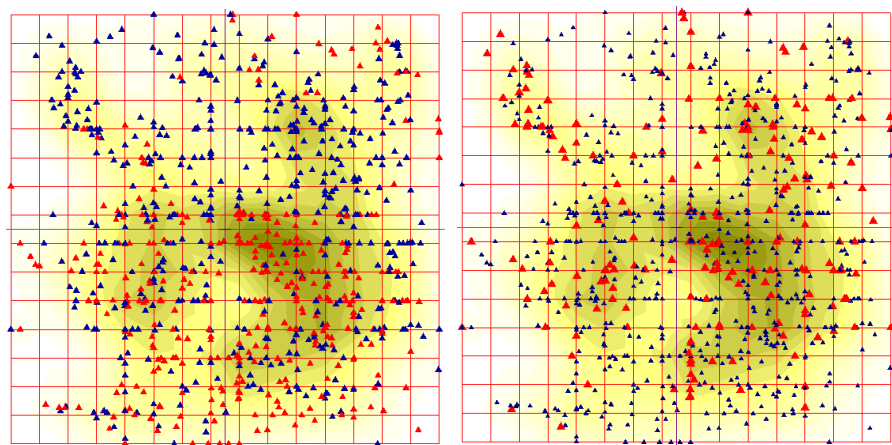

Figure 2: Wave-like (monocytes) pattern, left, and starry-like (eosinophile) pattern, right.

Fig. 2 shows two different patterns of the filling of the maps, as CBC character grows up, were found: the former is *wave*-like, and the latter is *starry*-like. The first pattern means the gradual filling of the map, while the second one means the (almost) random filling, as a character grows up. There are four CBC parameters (BAS, EOS, WBC and IG) yielding the *starry*-like filling pattern, for cancer patients. Some about eight CBC parameters exhibit this pattern for healthy people.

Conclusion: Cancer patients are stratified over CBC characters; the stratification differs from the similar observed over healthy people. The stratification of cancer patients may represent an unspecific organism reaction on the stress caused by the disease. This reaction should be taken into account, when long term treatment is carried out.