

## Chemometrics Methods Used by Spectroscopic of Biological Samples

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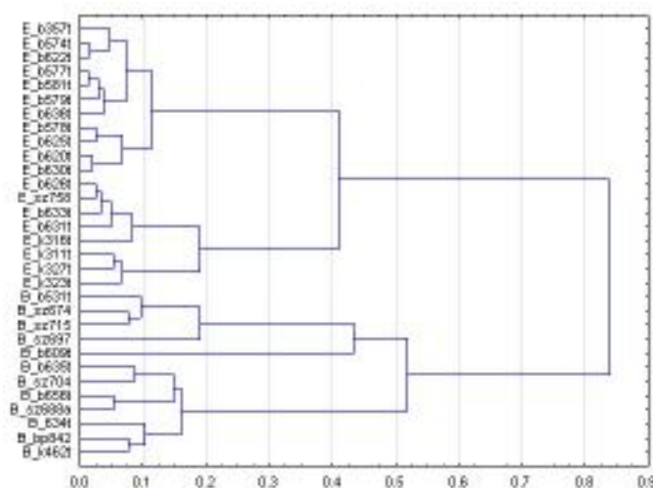
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The living tissues, like human skin and hair, have very complex biomolecular structures. These structures depend on the general health condition of the patient, and can be influenced by several external effects like stress situation, etc. It was shown in our laboratory that some illnesses can include more significant differences in the hair and skin spectra than other factors.

Due to the extremely complex structure of tissues a complete band assignment is impossible, however, small spectral changes even can be observed in the spectra. To a trustworthy analysis of discrepancies and a significant differentiation of the spectra the use of chemometrics methods like pattern recognition is indispensable.

Cluster analysis has been used for the spectra of healthy and unhealthy (cancerous) human skin (Fig.1). The cluster analysis makes groups, clusters without prior information. The method regards each spectrum as a separate group, then calculate the distance between the groups, and then it makes the two nearest group into a new one. The method iterate these two steps until only one type of group left, then can be seen the result. With this method we can discriminate the healthy and the cancerous human skin.

Cluster analysis has been used for the hair structure determination, too. The upper layer of hair is generally strongly degraded. We can differentiate between the surface degraded (e.g. bleached) features and the “living” layer of hair, so we can perform in an automated way the selection of useful spectra for further analysis to correlate with health condition.



**Fig. 1:** Cluster analysis result of healthy and unhealthy skin spectra. The upper is the spectra of a healthy human skin (started with “E”), and the lower spectra belong to the cancerous patient (started with “B”).

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