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### **ACCEPTED MANUSCRIPT**

#### Update on thalassemia diagnosis: new insights and methods

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#### Abstract

A novel approach based on Thermogravimetric analysis followed by Chemometrics (TGA/Chemometrics) is provided for Thalassemia diagnosis and a comprehensive study consisting of the coupled approach TGA/Chemometrics, the Complete Blood Count (CBC) and Red Blood Cell (RBC) indices is developed and results are compared.

A number of 128 subjects were involved in this study included 16 thalassemia intermedia transfusion-dependent (TI-TD) patients, 18 thalassemia intermedia non transfusion-dependent (TI-NTD) patients, and 14 thalassemia major  $\beta$  (TM-TD) patients. Thalassemic patients were found to be clearly distinct from healthy donors as a function of a different thermal behavior. The chemometric analysis identifies the differences in the composition of blood and a model of prediction for  $\beta$ -thalassemia was developed and validated to distinguish all patients. TGA/Chemometrics method also permitted to differentiate thalassemic patients

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