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Double venipuncture is not required for adequate S-100B determination in melanoma patients

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ABSTRACT

S-100B is used in melanoma follow-up. This serum biomarker is also present in adipocytes; therefore, subcutaneous adipocytes trapped in the needle before performing a venipuncture could contaminate the serum. The aim was to study the influence of adipocyte contamination on blood samples used for S-100B analysis, possibly resulting in falsely elevated S-100B values. A total of 294 serum samples were collected from 147 American Joint Committee on Cancer staging stage III melanoma patients. The mean difference between the first (dummy) and second tubes was 0.003 μg/l (p = 0.077), with a decrease in the second tube. Compared with the second tube, the S-100B level was higher in the first tube in 33.3% of the samples, equal in 36.8% of the samples and lower in 29.9% of the samples. No significant difference between the two consecutively drawn tubes was found. There seems to be no necessity of implementing a dummy tube system for accurate S-100B determination in melanoma patients.

METHOD SUMMARY

A dummy tube system was introduced for performance of venipunctures during regular follow-up in all American Joint Committee on Cancer staging stage III melanoma patients with no evidence of disease. After venipuncture, a dummy tube was drawn first, and subsequently the regular tube was drawn. The first tube was anonymously coded and stored, whereas the second tube was registered in the patients' medical results. After performing the assay, S-100B levels between the two consecutively drawn samples were compared.

KEYWORDS:

adipocytes ● biological tumor markers ● clinical laboratory techniques ● melanoma ● S100B protein

The biomarker S-100B is increasingly used and has important clinical value in screening, monitoring and predicting prognosis of melanoma patients [1–3]. Intracellular S-100B concentrations are usually high in disseminated melanoma (American Joint Committee on Cancer [AJCC], stage IV), and serum levels may be elevated [1,4]. The potentially aggressive and unpredictable character of melanoma strengthens the clinical desire to detect the first signs for disease progression as early as possible [5]. In some national melanoma guidelines (Germany, Switzerland), routine measurement of serum S-100B values is recommended [6,7,8]. However, melanoma studies that have tried to use S-100B for recurrence detection and prediction of sentinel node metastasis encountered problems due to the low sensitivity in these melanoma patients with minimal tumor load [9,10]. Another frequently encountered problem with biomarkers is the undesirable presence of false-positive and false-negative results [11]. For instance, patients' BMI and different comorbidities are associated with influencing serum S-100B values [11,12]. Multiple studies reported adipocytes to contain high levels of S-100B [13–19]. Determination of serum S-100B values in melanoma patients is performed by drawing a blood sample through a venipuncture and subsequent analysis of S-100B by immunoassay. Accurate determination and interpretation of serum S-100B is of high importance, especially in melanoma patients, where even minor changes of serum S-100B might have important clinical consequences. Diagnostic errors, like false-positive results, may lead to unnecessary anxious patients, potential hazardous overstaging and treatment, or even malpractice, accompanied with psychological trauma and increased healthcare costs [2].

Recently, S-100B values were found to be falsely elevated when mixed with subcutaneous cells, suggesting that adipocytes trapped in a venipuncture could affect the S-100B level [20]. The risk for this adipocyte contamination might especially be high in difficult venipunctures with longer subcutaneous routes, or after several attempts with the same needle. Hypothetically, adipocyte contamination only affects the first tube, as the needle will be flushed after drawing the first sample. The aim of this study was to test whether subcutaneous adipocytes cause falsely elevated S-100B values in blood samples of melanoma patients in routine venipunctures, and to study clinicopathological factors that might influence serum S-100B levels.