Letter to the Editor

Mehmet Kalayci*, Hakan Ayyildiz and Hatice Kalayci

Laboratory errors in the measurement of spectrin levels: detection range

Spektrin düzeylerinin ölçümünde laboratuvar hataları: ölçüm aralığı

https://doi.org/10.1515/tjb-2018-0123
Received March 31, 2018; accepted May 3, 2018; previously published online August 11, 2018

Keywords: Spectrin; Laboratory errors; Detection range.

To the editor; We read with great interest the article titled “Increased serum levels of spectrin degradation products in patients with schizophrenia,” which was published by Cetin and Demirel in your journal [1]. Regarding the rarity and necessity of the studies related to pathophysiology of diseases, which are evaluated within the group of Mood Disorders such as schizophrenia, we consider that the authors have had contribution to literature in this issue. However, we consider that the results of the mentioned study need to be evaluated again because it includes pre-analytical, analytical, or post-analytical mistakes.

The detection range of ELISA assay, which is used to measure the levels of serum SBDP120 and SBDP145, is determined by the producing company to be 3.12–200 ng/mL for SBDP120 and 0.625–40 ng/mL for SBDP145 in the catalogue of the assay [2, 3]. However, when the data of the study are examined, it is discerned that serum SBDP120 levels are reported to be 0.64 ± 1.38 ng/mL in the control and 2.08 ± 2.14 ng/mL in the patient, and serum SBDP145 levels are noted to be 0.23 ± 0.40 ng/mL in the control. The levels of SBDP120 and SBDP145 in their study were below the detection range of the assay. Considering that the detection range of SBDP120 test is 3.12–200 ng/mL, and the detection range of SBDP145 test is 0.625–40 ng/mL, we consider that it is unreliable to compare and contrast according to the levels, which are below the detection range of the assay. The reason is that we think that it is more appropriate to report the levels, which are below the detection range, as “<detection limit.”

Answers to letter to editor by İhsan Çetin

We would like to thank Prof. Dr. Yahya Laleli (Editor-in-Chief) for the opportunity to respond the Letter to the Editor written by Kalaycı M, Ayyıldız H, Kalaycı H. We also would like to thank the authors for their kind interest in our study entitled “Increased serum levels of spectrin degradation products in patients with schizophrenia” [1], and we appreciate their valuable comments. The followings are the responses to the main query in the letter.

As the authors have pointed out in their critique, the measurement limit of SBDP120 is expressed in the kit user guide as follows: “the concentration gradients of the kit standards or positive controls render a theoretical kit detection range of 3.12 ng/mL–200 ng/mL in biological research samples containing SBDP120, with an estimated sensitivity of the minimum detectable dose of human SBDP120 is typically less than 0.78 ng/mL”. It is seen that the following description is also written in the kit user guide: “the sensitivity of this assay, or lower limit of detection was defined as the lowest protein concentration that could be differentiated from zero [2]”. Similarly, the measurement limit of SBDP145 is expressed in the kit user guide as follows: “the concentration gradients of the kit standards or positive controls render a theoretical kit detection range of 0.625 ng/mL–40 ng/mL in biological research samples containing alpha II-spectrin breakdown product SBDP145, with an estimated sensitivity of the minimum detectable dose of human SBDP145 is typically less than 0.156 ng/mL”. It is

*Corresponding author: Mehmet Kalayci, Elazig Education and Research Hospital, Laboratory of Medical Biochemistry, Elazig, Turkey, e-mail: dr_mehmetkalayci@msn.com. http://orcid.org/0000-0001-9122-9289
Hakan Ayyildiz and Hatice Kalayci: Elazig Education and Research Hospital, Laboratory of Medical Biochemistry, Elazig, Turkey, e-mail: hknayyildiz@hotmail.com (H. Ayyildiz); dr_haticesari@yahoo.com (H. Kalayci). http://orcid.org/0000-0002-3133-9862 (H. Ayyildiz)
seen that the following description is also written in the kit user guide: “the sensitivity of this assay, or lower limit of detection was defined as the lowest protein concentration that could be differentiated from zero [3]”.

By strict definition, the limit of detection is the level at which a measurement has a 95% probability of being different from zero [4]. It is broadly defined as the concentration corresponding to the mean blank response (that is, the mean response produced by blank samples) plus three standard deviations of the blank response. While it is almost always possible to calculate values below the method limit of detection, these values are not considered to be statistically different from zero, and can also be reported as “below detection limit” or “nondetect” [5–7].

The analysis procedures of SBDP120 and SBDP145 were carried out as recommended in the kit user guide; and these processes were briefly explained in the materials and methods section of the article. In our study, these were applied to the wells on the ELISA plate and four blank wells (assigned zero antibody units) were also designated. It was assumed that there are not any antigen-antibody interactions in sample wells that do not exhibit a different absorbance from the blank, according to information of given the kit leaflet and the specified in literature [2–7]. Similar to blind wells, zero optical density was obtained from some sample wells. This situation is indicated in the findings section and emphasized as zero/above zero. In addition to, unlike glucose, sodium and high-density lipoprotein, etc., SBDP120 and SBDP145 molecules may not be present in the blood of every individual because spectrin degradation may not occur. Therefore, it was assumed that SBDP formation did not occur in samples with zero absorbance in our study, similar results were obtained with previous studies [8–10]. Considering these aspect, we want to specify in detail that only values above zero were calculated with including the control group or the patient group values, which are below the measurement limit and are accepted as zero.

Nevertheless, this publication is preliminary and the first study conducted in serum levels in this patient group. For this reason, we are currently working on confirming these findings in healthy and various patient groups, including schizophrenia; and these researches will be the continuation of this study.

We hope that these responses are informative; and we appreciate the authors’ query concerning with the manuscript.

References

2. MyBioSource Inc. Human alpha II-spectrin breakdown products SBDP120 (SBDP120) ELISA Kit. San Diego, USA.