



Human BDNF ELISA Kit

User Manual

Catalog # CEK1017

(Version 1.1C)

Sandwich Enzyme-Linked Immunosorbent Assay for Quantitative
Detection of Human BDNF Concentrations in Cell Culture
Supernatants, Serum, Plasma, Tissue Homogenates.

For research use only. Not for diagnostic or therapeutic procedures.

| | |
|---|----|
| I. INTRODUCTION..... | 2 |
| II. ASSAY PRINCIPLES..... | 3 |
| III. KIT COMPONENTS..... | 4 |
| IV. STORAGE AND STABILITY..... | 4 |
| V. MATERIALS REQUIRED BUT NOT PROVIDED..... | 5 |
| VI. HEALTH AND SAFETY PRECAUTIONS..... | 5 |
| VII. REAGENT PREPARATION..... | 6 |
| VIII. ASSAY PROCEDURE..... | 9 |
| IX. ASSAY PROCEDURE SUMMARY..... | 11 |
| X. TYPICAL DATA..... | 12 |
| XI. SENSITIVITY..... | 12 |
| XII. SPECIFICITY..... | 12 |
| XIII. CROSS REACTIVITY..... | 13 |
| XIV. REFERENCES..... | 13 |
| XV. TROUBLESHOOTING GUIDE..... | 14 |
| XVI. TECHNICAL SUPPORT..... | 15 |
| XVII. NOTES..... | 15 |

I. INTRODUCTION

Brain-derived neurotrophic factor (BDNF) is a prosurvival factor induced by cortical neurons that is necessary for survival of striatal neurons in the brain. It is a secreted protein with the molecular weight of 27.8kDa, consisting of 247 amino acids. It is known to promote neuronal survival and differentiation. BDNF shares substantial amino acid sequence identity with nerve growth factor (NGF). BDNF and neurotrophin-3 (NT-3) are two recently cloned neurotrophic factors that are homologous to NGF. mRNA products of the BDNF and NT-3 genes are detected in the adult human brain, suggesting that these proteins are involved in the maintenance of the adult nervous system. BDNF and other neurotrophins are critically involved in long-term potentiation (LTP). BDNF-mediated LTP is induced postsynaptically. BDNF has trophic effects on serotonergic (5-HT) neurons in the central nervous system. BDNF has an essential maintenance function in the regulation of anxiety-related behavior and in food intake through central mediators in both the basal and fasted state. It plays a role in treating breathing disorders such as respiratory insufficiency after spinal injury. The mature form of BDNF is identical in all mammals examined, and the gene encoding human BDNF to chromosome 11, band p13.

II. ASSAY PRINCIPLES

The Cohesion Bioscience Human BDNF ELISA (Enzyme-Linked Immunosorbent Assay) kit is an in vitro enzyme-linked immunosorbent assay for the quantitative measurement of Human BDNF in Cell Culture Supernatants, Serum, Plasma, Tissue Homogenates. This assay employs an antibody specific for Human BDNF coated on a 96-well plate. Standards and samples are pipetted into the wells and BDNF present in a sample is bound to the wells by the immobilized antibody. The wells are washed and biotinylated anti-Human BDNF antibody is added. After washing away unbound biotinylated antibody, HRP-conjugated streptavidin is pipetted to the wells. The wells are again washed, a TMB substrate solution is added to the wells and color develops in proportion to the amount of BDNF bound. The Stop Solution changes the color from blue to yellow, and the intensity of the color is measured at 450 nm.

III. KIT COMPONENTS

| Component | Volume |
|--|---------------------|
| 96-well Plate Coated With Anti-Human BDNF Antibody | 8 wells x 12 Strips |
| Human BDNF Standard | 1 ng x 2 |
| Biotin-Labeled Detection Antibody (100X) | 120 μ l |
| Streptavidin-HRP (100X) | 120 μ l |
| Standard/Sample Diluent | 30 ml |
| Detection Antibody Diluent | 12 ml |
| Streptavidin-HRP Diluent | 12 ml |
| Wash Buffer (20X) | 30 ml |
| TMB Substrate Solution | 12 ml |
| Stop Solution | 12 ml |
| Plate Adhesive Strips | 3 Strips |
| Technical Manual | 1 Manual |

IV. STORAGE AND STABILITY

All kit components are stable at 2 to 8 °C. Standard (recombinant protein) should be stored at -20 °C or -80 °C (recommended at -80 °C) after reconstitution. Opened Microplate Wells or reagents may be store for up to 1 month at 2 to 8 °C. Return unused wells to the pouch containing desiccant pack, reseal along entire edge.

Note: the kit can be used within one year if the whole kit is stored at -20 °C. Avoid repeated freeze-thaw cycles.

V. MATERIALS REQUIRED BUT NOT PROVIDED

1. Microplate reader capable of measuring absorbance at 450 nm.
2. Adjustable pipettes and pipette tips to deliver 2 µl to 1 ml volumes.
3. Adjustable 1-25 ml pipettes for reagent preparation.
4. 100 ml and 1 liter graduated cylinders.
5. Absorbent paper.
6. Distilled or deionized water.
7. Computer and software for ELISA data analysis.
8. Tubes to prepare standard or sample dilutions.

VI. HEALTH AND SAFETY PRECAUTIONS

1. Reagents provided in this kit may be harmful if ingested, inhaled or absorbed through the skin. Please carefully review the MSDS for each reagent before conducting the experiment.
2. Stop Solution contains 2 N Sulfuric Acid (H_2SO_4) and is an extremely corrosive agent. Please wear proper eye, hand and face protection when handling this material. When the experiment is finished, be sure to rinse the plate with copious amounts of running water to dilute the Stop Solution prior to disposing the plate.

VII. REAGENT PREPARATION

1. Sample Preparation

Store samples to be assayed within 24 hours at 2-8°C. For long-term storage, aliquot and freeze samples at -20°C. Avoid repeated freeze-thaw cycles.

Cell culture supernates: Remove particulates by centrifugation, assay immediately or aliquot and store samples at -20°C.

Serum: Allow the serum to clot in a serum separator tube (about 4 hours) at room temperature. Centrifuge at approximately 1000 X g for 15 minutes. Analyze the serum immediately or aliquot and store samples at -20°C.

Plasma: Collect plasma using heparin or EDTA as an anticoagulant. Centrifuge for 15 minutes at 1500 X g within 30 minutes of collection. Assay immediately or aliquot and store samples at -20°C.

Cell Lysates: Collect cells and rinse cells with PBS. Homogenize and lyse cells thoroughly in lysate solution. Centrifuge cell lysates at approximately 10000 X g for 5 minutes to remove debris. Aliquots of the cell lysates were removed and assayed.

Bone Tissue: Extract demineralized bone samples in 4 M Guanidine-HCl and protease inhibitors. Dissolve the final sample in 2 M Guanidine-HCl.

Tissue Homogenates: The preparation of tissue homogenates will vary depending upon tissue type. Rinse tissue with 1X PBS to remove excess blood, homogenized in 20 mL of 1X PBS and stored overnight at ≤ -20 °C. After two freeze-thaw cycles were performed to break the cell membranes, the homogenates were centrifuged for 5 minutes at 5000 x g. The supernate was removed immediately and assayed.

Alternatively, aliquot and store samples at ≤ -20 °C.

Note: Some lysis buffer, such as RIPA can not be used. Some components will affect the binding.

Urine: Urinary samples should be cleared by centrifugation and then can be used directly without dilution. Storage at -20°C.

2. Human BDNF Standard Preparation

Reconstitute the lyophilized Human BDNF Standard by adding 1 ml of Standard/Sample Diluent to make the 1000 pg/ml standard stock solution. Allow solution to sit at room temperature for 5 minutes, then gently vortex to mix completely. Use within one hour of reconstituting. Two tubes of the standard (1 ng per tube) are included in each kit. Use one tube for each experiment.

Perform 2-fold serial dilutions of the top standards to make the standard curve within the range of this assay (15.6 pg/ml - 1000 pg/ml) as below. Standard/Sample Dilution Buffer serves as the zero standard (0 pg/ml).

| Standard | Add | Into |
|------------|-------------------------------------|---------------------------------------|
| 1000 pg/ml | | |
| 500 pg/ml | 500 µl of the Standard (1000 pg/ml) | 500 µl of the Standard/Sample Diluent |
| 250 pg/ml | 500 µl of the Standard (500 pg/ml) | 500 µl of the Standard/Sample Diluent |
| 125 pg/ml | 500 µl of the Standard (250 pg/ml) | 500 µl of the Standard/Sample Diluent |
| 62.5 pg/ml | 500 µl of the Standard (125 pg/ml) | 500 µl of the Standard/Sample Diluent |
| 31.2 pg/ml | 500 µl of the Standard (62.5 pg/ml) | 500 µl of the Standard/Sample Diluent |
| 15.6 pg/ml | 500 µl of the Standard (31.2 pg/ml) | 500 µl of the Standard/Sample Diluent |
| 0 pg/ml | 1 ml of the Standard/Sample Diluent | |

Note: The standard solutions are best used within 2 hours. The 1000 pg/ml standard solution should be stored at 4°C for up to 12 hours, or at -20°C for up to 48 hours.

Avoid repeated freeze-thaw cycles.

3. Biotin-Labeled Detection Antibody Working Solution Preparation

The Biotin-Labeled Detection Antibody should be diluted in 1:100 with the Detection Antibody Diluent and mixed thoroughly. The solution should be prepared no more than 2 hours prior to the experiment.

4. Streptavidin-HRP Working Solution Preparation

The Streptavidin-HRP should be diluted in 1:100 with the Streptavidin-HRP Diluent and mixed thoroughly. The solution should be prepared no more than 1 hour prior to the experiment.

5. Wash Buffer Working Solution Preparation

Pour entire contents (30 ml) of the Wash Buffer Concentrate into a clean 1,000 ml graduated cylinder. Bring final volume to 600 ml with glass-distilled or deionized water (1:20).

VIII. ASSAY PROCEDURE

The Streptavidin-HRP Working Solution and TMB Substrate Solution must be kept warm at 37°C for 30 minutes before use. When diluting samples and reagents, they must be mixed completely and evenly. Standard detection curve should be prepared for each experiment. The user will decide sample dilution fold by crude estimation of protein amount in samples.

1. Add 100 μ l of each standard and sample into appropriate wells.
2. Cover well and incubate for 90 minutes at room temperature or over night at 4°C with gentle shaking.
3. Remove the cover, discard the solution and wash plate 3 times with Wash Buffer Working Solution, and each time let Wash Buffer Working Solution stay in the wells for 1 - 2 minutes. Blot the plate onto paper towels or other absorbent material. Do NOT let the wells completely dry at any time.
4. Add 100 μ l of Biotin-Labeled Detection Antibody Working Solution into each well and incubate the plate at 37°C for 60 minutes.
5. Wash plate 3 times with Wash Buffer Working Solution, and each time let Wash Buffer Working Solution stay in the wells for 1 - 2 minutes. Discard the Wash Buffer Working Solution and blot the plate onto paper towels or other absorbent material.
6. Add 100 μ l of Streptavidin-HRP Working Solution into each well and incubate the plate at 37°C for 45 minutes.
7. Wash plate 5 times with Wash Buffer Working Solution, and each time let wash buffer stay in the wells for 1 - 2 minutes. Discard the wash buffer and blot the plate onto paper towels or other absorbent material.
8. Add 100 μ l of TMB Substrate Solution into each well and incubate plate at 37°C in dark for 10-20 minutes.
9. Add 100 μ l of Stop Solution into each well. The color changes into yellow immediately.

10. Read the O.D. absorbance at 450nm in a microplate reader within 30 minutes after adding the Stop Solution.

For calculation, (the relative O.D.450) = (the O.D.450 of each well) - (the O.D.450 of Zero well). The standard curve can be plotted as the relative O.D.450 of each standard solution (Y) vs. the respective concentration of the standard solution (X). The concentration of the samples can be interpolated from the standard curve.

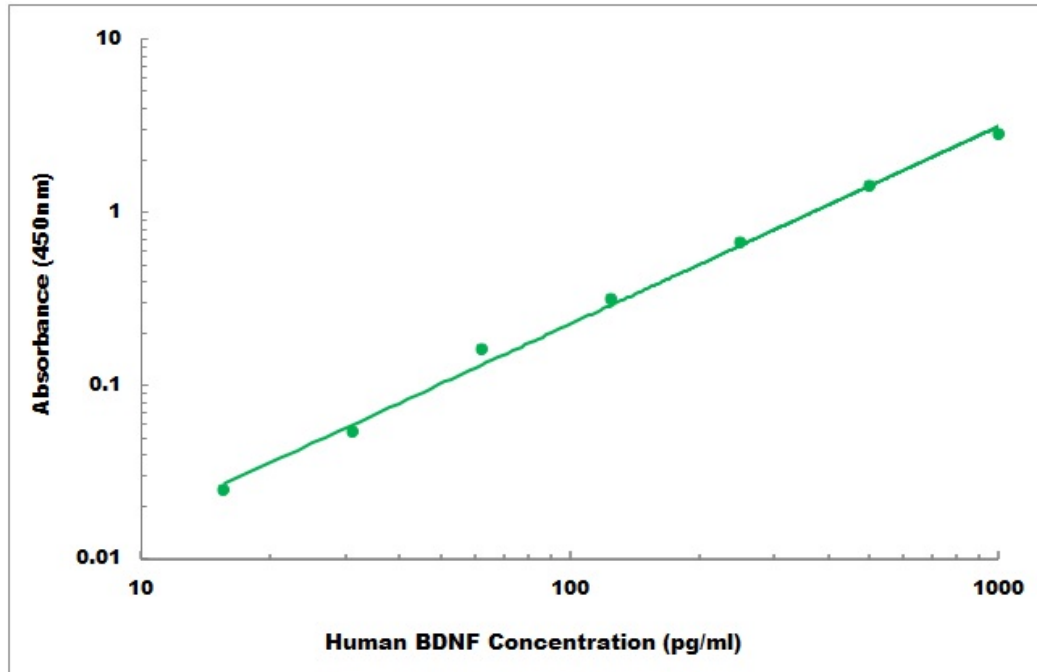
Note: If the samples measured were diluted, multiply the dilution factor to the concentrations from interpolation to obtain the concentration before dilution.

IX. ASSAY PROCEDURE SUMMARY

- 
- Prepare all reagents, samples and standards
 - Add 100 μ l Standard or Sample
 - Wash plate 3 times with Wash Buffer Working Solution
 - Add 100 μ l Biotin-Labeled Detection Antibody Working Solution
 - Wash plate 3 times with Wash Buffer Working Solution
 - Add 100 μ l Streptavidin-HRP Working Solution
 - Wash plate 5 times with Wash Buffer Working Solution
 - Add 100 μ l TMB Substrate Solution
 - Add 100 μ l Stop Solution
 - Read the plate at 450nm

X. TYPICAL DATA

The standard curve is for demonstration only. A standard curve must be run with each assay.



XI. SENSITIVITY

The minimum detectable dose of Human BDNF is typically less than 8 pg/ml.

XII. SPECIFICITY

The Human BDNF ELISA Kit allows for the detection and quantification of endogenous levels of natural and/or recombinant Human BDNF proteins within the range of 15.6 pg/ml - 1000 pg/ml.

XIII. CROSS REACTIVITY

No detectable cross-reactivity with other relevant proteins.

XIV. REFERENCES

1. Jones, K. R.; Reichardt, L. F. Molecular cloning of a human gene that is a member of the nerve growth factor family. *Proc. Nat. Acad. Sci.* 87: 8060-8064, 1990.
2. Kovalchuk, Y.; Hanse, E.; Kafitz, K. W.; Konnerth, A. Postsynaptic induction of BDNF-mediated long-term potentiation. *Science* 295: 1729-1734, 2002.
3. Lyons, W. E.; Mamounas, L. A.; Ricaurte, G. A; Coppola, V.; Reid, S. W.; Bora, S. H.; Wihler, C.; Koliatsos, V. E.; Tessarollo, L. Brain-derived neurotrophic factor-deficient mice develop aggressiveness and hyperphagia in conjunction with brain serotonergic abnormalities. *Proc. Nat. Acad. Sci.* 96: 15239-15244, 1999.
4. Rios, M.; Fan, G.; Fekete, C.; Kelly, J.; Bates, B.; Kuehn, R.; Lechan, R. M.; Jaenisch, R. Conditional deletion of brain-derived neurotrophic factor in the postnatal brain leads to obesity and hyperactivity. *Molec. Endocr.* 15: 1748-1757, 2001.
5. Baker-Herman, T. L.; Fuller, D. D.; Bavis, R. W.; Zabka, A. G.; Golder, F. J.; Doperalski, N. J.; Johnson, R. A.; Watters, J. J.; Mitchell, G. S. BDNF is necessary and sufficient for spinal respiratory plasticity following intermittent hypoxia. *Nature Neurosci.* 7: 48-55, 2004.
6. Maisonpierre, P. C.; Le Beau, M. M.; Espinosa, R., III; Ip, N. Y.; Belluscio, L.; de la Monte, S. M.; Squinto, S.; Furth, M. E.; Yancopoulos, G. D. Human and rat brain-derived neurotrophic factor and neurotrophin-3: gene structures, distributions and chromosomal localizations. *Genomics* 10: 558-568, 1991.

XV. TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Solution |
|--|--|---|
| High signal and background in all wells | • Insufficient washing | • Increase number of washes • Increase time of soaking between in wash |
| | • Too much Streptavidin-HRP | • Check dilution, titration |
| | • Incubation time too long | • Reduce incubation time |
| | • Development time too long | • Decrease the incubation time before the stop solution is added |
| No signal | • Reagent added in incorrect order, or incorrectly prepared | • Review protocol |
| | • Standard has gone bad (If there is a signal in the sample wells) | • Check the condition of stored standard |
| | • Assay was conducted from an incorrect starting point | • Reagents allows to come to 20 - 30 °C before performing assay |
| Too much signal-whole plate turned uniformly blue | • Insufficient washing-unbound Streptavidin-HRP remaining | • Increase number of washes Carefully |
| | • Too much Streptavidin-HRP | • Check dilution |
| | • Plate sealer or reservoir reused, resulting in presence of residual Streptavidin-HRP | • Use fresh plate sealer and reagent reservoir for each step |
| Standard curve achieved but poor discrimination between point | • Plate not developed long enough | • Increase substrate solution incubation time |
| | • Improper calculation of standard curve dilution | • Check dilution, make new standard curve |
| No signal when a signal is expected, but standard curve looks fine | • Sample matrix is masking detection | • More diluted sample Recommended |
| Samples are reading too high, but standard curve is fine | • Samples contain protein levels above assay range | • Dilute samples and run Again |
| Edge effect | • Uneven temperature around work surface | • Avoid incubating plate in areas where environmental conditions vary • Use plate sealer |

XVI. TECHNICAL SUPPORT

For troubleshooting, information or assistance, please go online to www.cohesionbio.com or contact us at techsupport@cohesionbio.com

COHESION BIOSCIENCES LIMITED

FLAT32 ADVENTURES COURT

12 NEWPORT AVENUE

LONDON, E14 2DN, UK

Website: www.cohesionbio.com

Email: order@cohesionbio.com

techsupport@cohesionbio.com

custom@cohesionbio.com

XVII. NOTES