

EnzyChrom™ Choline Assay Kit (ECHO-100)

Quantitative Colorimetric/Fluorometric Choline Determination

DESCRIPTION

CHOLINE and its metabolites play important roles in membrane structure integrity, cellular signaling and cholinergic neurotransmission. Aberrant regulation in choline metabolism has been associated with mental illness such as anxiety. BioAssay Systems' method provides a simple, direct and high-throughput assay for measuring choline in biological samples. In this assay, free choline is oxidized by choline oxidase to betaine and H₂O₂ which reacts with a specific dye to form a pink colored product. The color intensity at 570nm or fluorescence intensity (530/585 nm) is directly proportional to the choline concentration in the sample.

KEY FEATURES

Use 20 μ L samples. Linear detection range: colorimetric assay 1 to 100 μ M, fluorimetric assay 0.2 to 10 μ M choline.

APPLICATIONS

Assays: choline in biological samples such as serum, plasma, urine, saliva, milk, tissue, and cell culture.

Drug Discovery/Pharmacology: effects of drugs on choline metabolism.

KIT CONTENTS

Assay Buffer: 10 mL **Enzyme Mix:** 120 μ L
Dye Reagent: 120 μ L **Standard:** 400 μ L 2 mM Choline

Storage conditions. The kit is shipped on ice. Store all components at -20°C. Shelf life of three months after receipt.

Precautions: reagents are for research use only. Normal precautions for laboratory reagents should be exercised while using the reagents. Please refer to Material Safety Data Sheet for detailed information.

COLORIMETRIC ASSAY

Sample treatment: liquid samples such as serum and plasma can be assayed directly. Tissue and cell lysates can be prepared by homogenization in cold 1 x PBS and centrifugation (5 min at 14,000 rpm). Use clear supernatants for assay. Milk samples should be cleared by mixing 600 μ L milk with 100 μ L 6 N HCl. Centrifuge 5 min at 14,000 rpm. Transfer 300 μ L supernatant into a clean tube and neutralize with 50 μ L 6 N NaOH. The neutralized supernatant is ready for assay (dilution factor $n = 1.36$).

Note: (1). SH-containing reagents (e.g. β -mercaptoethanol, dithiothreitol, > 5 μ M) are known to interfere in this assay and should be avoided in sample preparation. (2). This assay is based on an enzyme-catalyzed kinetic reaction. Addition of Working Reagent should be quick and mixing should be brief but thorough.

- Equilibrate all components to room temperature. Briefly centrifuge the tubes before opening. Keep thawed tubes on ice during assay.
- Standards:** mix 12 μ L 2 mM Standard with 228 μ L dH₂O (final 100 μ M). Dilute standard in dH₂O as follows.

No	100 μ M STD + H ₂ O	Vol (μ L)	Choline (μ M)
1	100 μ L + 0 μ L	100	100
2	60 μ L + 40 μ L	100	60
3	30 μ L + 70 μ L	100	30
4	0 μ L + 100 μ L	100	0

Transfer 20 μ L diluted standards into separate wells of a clear flat-bottom 96-well plate.

Samples: transfer 20 μ L of each sample into separate wells of the plate.

- Color reaction.** Prepare enough Working Reagent by mixing, for each reaction well, 85 μ L Assay Buffer, 1 μ L Enzyme Mix and 1 μ L Dye Reagent. Add 80 μ L Working Reagent to each well. Tap plate to mix. Incubate 20 min at room temperature.

- Read optical density at 570nm (550-585nm).

FLUORIMETRIC ASSAY

The fluorimetric assay is 10 times more sensitive than the colorimetric method. The procedure is similar to that for the Colorimetric Assay except that (1) 0, 3, 6 and 10 μ M choline standards and (2) a black 96-well plate are used. Read fluorescence intensity at $\lambda_{\text{ex}} = 530$ nm and $\lambda_{\text{em}} = 585$ nm.

Note: if the calculated choline concentration of a sample is higher than 100 μ M in the Colorimetric Assay or 10 μ M in the Fluorimetric Assay, dilute sample in water and repeat the assay. Multiply result by the dilution factor n .

CALCULATION

Subtract blank value (#4) from the standard values and plot the Δ OD or Δ F against standard concentrations. Determine the slope and calculate the choline concentration of Sample,

$$[\text{Choline}] = \frac{R_{\text{SAMPLE}} - R_{\text{BLANK}}}{\text{Slope } (\mu\text{M}^{-1})} \times n \quad (\mu\text{M})$$

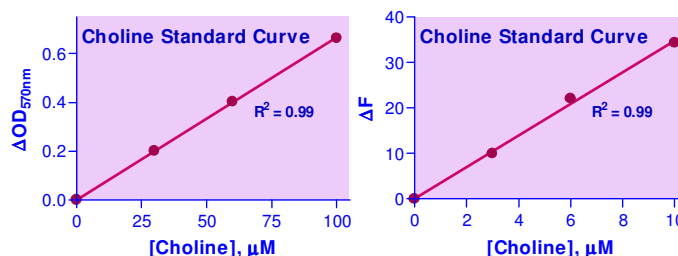
R_{SAMPLE} and R_{BLANK} are optical density or fluorescence intensity readings of the Sample and H₂O Blank, respectively. n is the sample dilution factor.

Conversions: 1 mM choline equals 10.4 mg/dL, 0.010% or 104 ppm.

MATERIALS REQUIRED, BUT NOT PROVIDED

Pipetting devices, centrifuge tubes, clear flat-bottom uncoated 96-well plates, optical density plate reader; black flat-bottom uncoated 96-well plates, fluorescence plate reader.

Choline Standard Curves



96-well colorimetric assay

96-well fluorimetric assay

LITERATURE

- Lartillot, S. (1987). A simplified method of production of choline oxidase suitable for choline assay. *Prep Biochem.* 17:283-295.
- Gilberstadt, M.L. and Russell, J.A. (1984). Determination of picomole quantities of acetylcholine and choline in physiologic salt solutions. *Anal Biochem.* 138:78-85.
- Zeisel, S.H. and Millington, W.R. (1978). Free and choline assay. *Am J Clin Nutr.* 31:1978-1981.