EnzyChrom™ Choline Assay Kit (ECHO-100)

Quantitative Colorimetric/Fluorimetric 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 H_2O_2 which reacts with a specific dye to form a pink colored product. The color intensity at 570 nm or fluorescence intensity (530/585 nm) is directly proportional to the choline concentration in the sample.

KEY FEATURES

Use 20 µL samples. Linear detection range: colorimetric assay 1 to 100 µM, fluorimetric assay 0.2 to 10 µM 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:** Dried
Dye Reagent: 120 µL **Standard**: 400 µL 2 mM Choline

Storage conditions. The kit is shipped on ice. Store all components at -20°C. Shelf life of six 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 × PBS and centrifugation (5 min at 14,000 rpm). Use clear supernatants for assay. Milk samples should be cleared by mixing 600 µL milk with 100 µL 6 N HCl. Centrifuge 5 min at 14,000 rpm. Transfer 300 µL supernatant into a clean tube and neutralize with 50 µL 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 µM) 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.

1. Equilibrate all components to room temperature. Briefly centrifuge the tubes before opening. Keep thawed tubes on ice during assay. Reconstitute Enzyme Mix with 120 µL Assay Buffer. Reconstituted Enzyme Mix is stable for 1 month when stored at -20˚C. *Note: a yellow precipitate may form after thawing reconstituted Enzyme Mix. If a precipitate forms, pellet it by centrifuging for 2 min at 14000 rpm and use the clear supernatant.*
2. *Standards*: mix 12 µL 2 mM Standard with 228 µL dH_2O (final 100 µM). Dilute standard in dH_2O as follows.

No	100 µM STD + H_2O	Vol (µL)	Choline (µM)
1	100 µL + 0 µL	100	100
2	60 µL + 40 µL	100	60
3	30 µL + 70 µL	100	30
4	0 µL + 100 µL	100	0

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

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

3. Color r*eaction*. Prepare enough Working Reagent by mixing, for each reaction well, 85 µL Assay Buffer, 1 µL Enzyme Mix and 1 µL Dye Reagent. Add 80 µL Working Reagent to each well. Tap plate to mix. Incubate 30 min at room temperature.
4. Read optical density at 570 nm (550-585 nm).

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 µM choline standards and (2) a black 96-well plate are used. Read fluorescence intensity at λ_{ex} = 530 nm and λ_{em} = 585 nm.

Note: if the calculated choline concentration of a sample is higher than 100 µM in the Colorimetric Assay or 10 µM 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 ΔOD or ΔF against standard concentrations. Determine the slope and calculate the choline concentration of Sample,

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

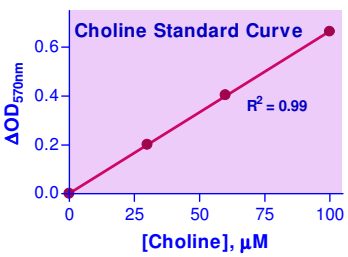
R_{SAMPLE} and R_{BLANK} are optical density or fluorescence intensity readings of the Sample and H_2O Blank, respectively. n is the sample dilution factor.

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

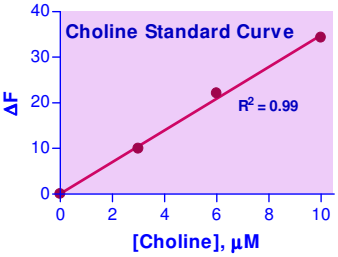
MATERIALS REQUIRED, BUT NOT PROVIDED

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

PUBLICATIONS

1. Winnard Jr, PT et al (2020). Brain metabolites in cholinergic and glutamatergic pathways are altered by pancreatic cancer cachexia. Journal of Cachexia, Sarcopenia and Muscle, 11(6).
2. Ballester-Lozano, GF et al (2015). Comprehensive biometric, biochemical and histopathological assessment of nutrient deficiencies in gilthead sea bream fed semi-purified diets. British Journal of Nutrition 114(5): 713-726.
3. Benedito-Palos, L et al (2015). Lasting effects of butyrate and low FM/FO diets on growth performance, blood haematology/biochemistry and molecular growth-related markers in gilthead sea bream (Sparus aurata). Aquaculture 454: 8-18