

## Product Information

**CAMKK1, active, GST-tagged, human  
PRECISIO® Kinase  
recombinant, expressed in *Sf9* cells**

Catalog Number **C0370**  
Lot Number 041M0967  
Storage Temperature  $-70^{\circ}\text{C}$

Synonyms: CAMKKA, MGC34095, DKFZp761M0423

### Product Description

CAMKK1 or CAMKKalpha is a  $\text{Ca}^{2+}$ /calmodulin-dependent protein kinase that activates CAM-kinases I and IV via phosphorylation of Thr<sup>177</sup> and Thr<sup>196</sup> residues, respectively. Recent studies have shown the activity of CAMKK1 is decreased upon phosphorylation by cAMP-dependent protein kinase (PKA).<sup>1</sup> CAMKK1 has been identified in intact cells as AMPKKs, predicting a significant role for this kinase in regulating AMPK activity *in vivo*. It has been shown 2-deoxy-glucose and ionomycin-stimulated AMPK activity is substantially reduced in HeLa cells transfected with small interfering RNAs specific for CAMKK1.<sup>2</sup>

This recombinant product was expressed by baculovirus in *Sf9* insect cells using an N-terminal GST-tag. The gene accession number is NM 032294. It is supplied in 50 mM Tris-HCl, pH 7.5, with 150 mM NaCl, 0.25 mM DTT, 0.1 mM EGTA, 0.1 mM EDTA, 0.1 mM PMSF, and 25% glycerol.

Molecular mass: ~94 kDa

Purity:  $\geq 70\%$  (SDS-PAGE, see Figure 1)

Specific Activity: 9–12 nmole/min/mg (see Figure 2)

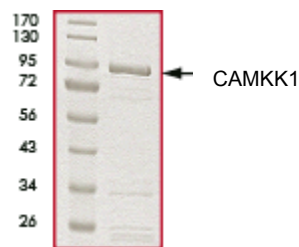
### Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

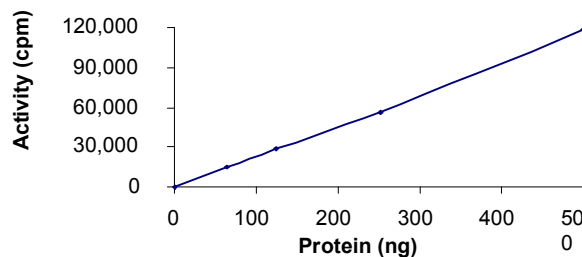
### Storage/Stability

The product ships on dry ice and storage at  $-70^{\circ}\text{C}$  is recommended. After opening, aliquot into smaller quantities and store at  $-70^{\circ}\text{C}$ . Avoid repeated handling and multiple freeze/thaw cycles.

**Figure 1.**  
SDS-PAGE Gel of Lot Number 041M0967:  
>90% (densitometry)



**Figure 2.**  
Specific Activity of Lot Number 041M0967:  
10 nmole/min/mg



### Procedure

#### Preparation Instructions

Kinase Assay Buffer – 25 mM MOPS, pH 7.2, 12.5 mM glycerol 2-phosphate, 25 mM  $\text{MgCl}_2$ , 5 mM EGTA, and 2 mM EDTA. Just prior to use, add DTT to a final concentration of 0.25 mM.

Kinase Dilution Buffer – Dilute the Kinase Assay Buffer 5-fold with a 50 ng/ $\mu\text{L}$  BSA and 5% glycerol solution.

Kinase Solution – Dilute the active CAMKK1 (0.1 µg/µl) with Kinase Dilution Buffer to the desired concentration. **Note:** The lot-specific specific activity plot may be used as a guideline (see Figure 2). It is recommended the researcher perform a serial dilution of active CAMKK1 kinase for optimal results.

10 mM ATP Stock Solution – Dissolve 55 mg of ATP in 10 ml of Kinase Assay Buffer. Store in 200 µl aliquots at –20 °C.

$\gamma$ -<sup>32</sup>P-ATP Assay Cocktail (250 µM) – Combine 5.75 ml of Kinase Assay Buffer, 150 µl of 10 mM ATP Stock Solution, 100 µl of  $\gamma$ -<sup>32</sup>P-ATP (1 mCi/100 µl). Store in 1 ml aliquots at –20 °C.

Substrate Solution – Dissolve the substrate myelin basic protein (MBP) in water at a final concentration of 1 mg/ml.

1% phosphoric acid solution – Dilute 10 ml of concentrated phosphoric acid to a final volume of 1 L with water.

#### Kinase Assay

This assay involves the use of the <sup>32</sup>P radioisotope. All institutional guidelines regarding the use of radioisotopes should be followed.

1. Thaw the active CAMKK1, Kinase Assay Buffer, Substrate Solution, and Kinase Dilution Buffer on ice. The  $\gamma$ -<sup>32</sup>P-ATP Assay Cocktail may be thawed at room temperature.
2. In a pre-cooled microcentrifuge tube, add the following solutions to a volume of 20 µl:  
 10 µl of Kinase Solution  
 7.5 µl of Substrate Solution  
 2.5 µl of 5 mM CaCl<sub>2</sub> solution containing 0.75 µg Calmodulin
3. Set up a blank control as outlined in step 2, substituting 7.5 µl of cold water (4 °C) for the Substrate Solution.
4. Initiate each reaction with the addition of 5 µl of the  $\gamma$ -<sup>32</sup>P-ATP Assay Cocktail, bringing the final reaction volume to 25 µl. Incubate the mixture in a water bath at 30 °C for 15 minutes.
5. After the 15 minute incubation, stop the reaction by spotting 20 µl of the reaction mixture onto an individually pre-cut strip of phosphocellulose P81 paper.

6. Air dry the pre-cut P81 strip and sequentially wash in the 1% phosphoric acid solution with constant gentle stirring. It is recommended the strips be washed a total of 3 times of ~10 minutes each.
7. Set up a radioactive control to measure the total  $\gamma$ -<sup>32</sup>P-ATP counts introduced into the reaction. Spot 5 µl of the  $\gamma$ -<sup>32</sup>P-ATP Assay Cocktail on a pre-cut P81 strip. Dry the sample for 2 minutes and read the counts. Do not wash this sample.
8. Count the radioactivity on the P81 paper in the presence of scintillation fluid in a scintillation counter.
9. Determine the corrected cpm by subtracting the blank control value (see step 3) from each sample and calculate the kinase specific activity

#### Calculations:

1. Specific Radioactivity (SR) of ATP (cpm/nmole)

$$SR = \frac{\text{cpm of 5 } \mu\text{l of } \gamma\text{-}^{32}\text{P-ATP Assay Cocktail}}{\text{nmole of ATP}}$$

cpm – value from control (step 7)  
 nmole – 1.25 nmole (5 µl of 250 µM ATP Assay Cocktail)

2. Specific Kinase Activity (SA) (nmole/min/mg)

$$\text{nmole/min/mg} = \frac{\Delta\text{cpm} \times (25/20)}{SR \times E \times T}$$

SR = specific radioactivity of the ATP (cpm/nmole ATP)

$\Delta\text{cpm}$  = cpm of the sample – cpm of the blank (step 3)

25 = total reaction volume

20 = spot volume

T = reaction time (minutes)

E = amount of enzyme (mg)

#### References

1. Okuno, S. et al., Regulation of Ca<sup>2+</sup>/calmodulin-dependent protein kinase kinase alpha by cAMP-dependent protein kinase: I. Biochemical analysis. J. Biochem. (Tokyo), **130**, 503-513 (2001).
2. Hurley, R.L. et al., The Ca<sup>2+</sup>/calmodulin-dependent protein kinase kinases are AMP-activated protein kinase kinases. J. Biol. Chem., **280**, 29060-29066 (2005).

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