

# UBE2M (Ubc12) [GST-tagged]

## E2 - NEDD8 Conjugating Enzyme

Alternate Names: Nedd8-conjugating enzyme Ubc12, UBC-RS2, UBC12

Cat. No. 62-0088-020

Lot. No. 1840

Quantity: 20 µg

Storage: -70°C

FOR RESEARCH USE ONLY

NOT FOR USE IN HUMANS



CERTIFICATE OF ANALYSIS Page 1 of 2

### Background

The enzymes of the NEDDylation pathway play a pivotal role in a number of cellular processes including the indirect regulation and targeting of substrate proteins for proteasomal degradation. Three classes of enzymes are involved in the process of NEDDylation; the ubiquitin-like activating enzyme APP-BP1/Uba3 (E1), the ubiquitin-like conjugating enzymes (E2s) and protein ligases (E3s). UBE2M is a member of the E2 conjugating enzyme family and the cDNA for Human UBE2M was first described by Osaka *et al.* (1998) and shares 42% sequence identity with yeast UBE2M. A trapped ubiquitin like activation complex has been described for the NEDD8 pathway comprising, the E1 APP-BP1/Uba3, two NEDD8 molecules, UBE2M and MgATP. Thioester linkage of NEDD8 to APP-BP1-Uba3 results in an alternate E1 conformation that exposes two NEDD8 binding sites on the E2 enzyme. After transfer of the non-covalently bound NEDD8 to the E2, an alternate E1 conformation allows the release of the thioester bound NEDD8 product. Transference of the NEDD8 thioester linkage between E1 and E2 enzymes in this way can induce a conformational change and alter downstream signalling in the NEDD8 ubiquitin-like (Ubl) cascade (Huang *et al.*, 2007). The interaction of different E2 enzymes with different Cullin RING E3 Ligases (CRLs) has been determined; for example

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### Physical Characteristics

**Species:** human

**Source:** *E. coli* expression

**Quantity:** 20 µg

**Concentration:** 1 mg/ml

**Formulation:** 50 mM HEPES pH 7.5, 150 mM sodium chloride, 2 mM dithiothreitol, 10% glycerol

**Molecular Weight:** ~49 kDa

**Purity:** >98% by InstantBlue™ SDS-PAGE

**Stability/Storage:** 12 months at -70°C; aliquot as required

### Protein Sequence:

**MSPILGYWKIKGLVQPTRLLEYLEEKYEEH  
LYERDEGDKWRNKKFELGLEFPNLPYYIDGD  
VKLTQSMAIIRYIADKHNMLGGCPKERAIEISMLE  
GAVLDIRYGVSR IAYSKDFETLKVDFLSKLP  
LKMFE DRLCHKTYLNGDHVTHPDFMLYDALDV  
VLYMDPMCLDAFPKLVCFKKRIEAIPOIDKY  
LKSSKYIAWPLQGWQATFGGGDHPKSDLELV  
LFQGPLGSPGIPGSTRAAAMIKLFLSKQQKKEE  
SAGGTKGSSKKASAAQLRIQKDNELNLPKTC  
ISFSDPDDLNLNFKLVICPDEGFYKSGKFFVS  
FKVGQGYPHDPPKVKCETMVYHPNIDLEGNVCL  
NILREDWKPVL TINSIIYGLQYLFLEPNPED  
PLNKEAAEVLQNNRRLFQONVQSRMGGYIGSTY  
FERCLK**

Tag (**bold text**): N-terminal GST

Protease cleavage site: PreScission™ (LELVFQ▼GP)

UBE2M (regular text): Start **bold italics** (amino acid residues 1-183)

Accession number: AAH58924

### Quality Assurance

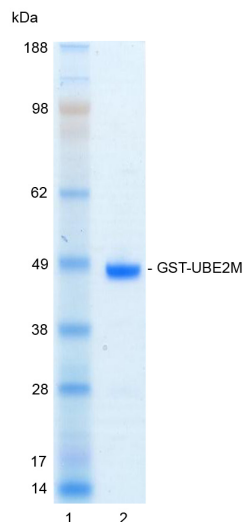
#### Purity:

4-12% gradient SDS-PAGE

InstantBlue™ staining

Lane 1: MW markers

Lane 2: 1 µg GST-UBE2M



#### Protein Identification:

Confirmed by mass spectrometry.

#### E2-NEDD8 Thioester Loading Assay:

The activity of GST-UBE2M was validated by loading E1 APP-BP1/Uba3 activated NEDD8 onto the active cysteine of the GST-UBE2M E2 enzyme via a transthiolation reaction. Incubation of the APP-BP1/Uba3 and GST-UBE2M enzymes in the presence of NEDD8 and ATP at 30°C was compared at two time points, T<sub>0</sub> and T<sub>10</sub> minutes. Sensitivity of the NEDD8/GST-UBE2M thioester bond to the reducing agent DTT was confirmed.



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Lot-specific COA version tracker: v1.0.0

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UBE2M/RBX1 and UBE2F/RBX2 can interact with such ligases. This reveals the functional importance of hierarchical expansion of the NEDD8 conjugation system in establishing selective CRL activation (Huang *et al.*, 2009). Following ionizing irradiation of a human esophageal cancer cell line a cDNA microarray screen found UBE2M to be upregulated suggesting a role for UBE2M in esophageal cancer (Bo *et al.*, 2004).

## References:

Bo H, Ghazizadeh M, Shimizu H, Kurihara Y, Egawa S, Moriyama Y, Tajiri T, Kawanami O (2004) Effect of ionizing irradiation on human esophageal cancer cell lines by cDNA microarray gene expression analysis. *J Nippon Med Sch* **71**, 172-80.

Huang DT, Ayrault O, *et al.* (2009) E2-RING expansion of the NEDD8 cascade confers specificity to cullin modification. *Mol Cell* **33**, 483-95.

Huang DT, Hunt HW, Zhuang M, Ohi MD, Holton JM, Schulman BA (2007) Basis for a ubiquitin-like protein thioester switch toggling E1-E2 affinity. *Nature* **445**, 394-8.

Osaka F, Kawasaki H, Aida N, Saeki M, Chiba T, Kawashima S, Tanaka K, Kato S (1998) A new NEDD8-ligating system for cullin-4A. *Genes Dev* **12**, 2263-8.



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