Nucleotide sequence of a rabbit cDNA encoding elongation factor 1 gamma

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Elongation factor 1 participates in protein synthesis by binding aminoacyl-tRNA to 80S ribosomes with the hydrolysis of GTP. EF-1 γ , a complex of two polypeptide chains, facilitates the nucleotide exchange of EF-1 α ·GDP to EF-1 α ·GTP in order to participate in another round of elongation. The actual nucleotide exchange activity in EF-1 γ is due to EF-1 β . EF-1 γ , an EF-1 β -associated protein, stimulates the GDP/GTP exchange activity. EF-1 γ alone has no measurable exchange activity (reviewed in 1). By means of proteolytic digestion and immunoblotting, it has been found that the amino-terminal half of EF-1 β and EF-1 γ are associated (2).

Previously, EF-1 γ has been cloned and sequenced from three species, *Artemia salina* (3), *Xenopus* oocytes (4) and human (5). The rabbit EF-1 γ cDNA was isolated from a Stratagene rabbit spleen cDNA library (cat # 937901) using *Artemia* EF-1 γ cDNA as a probe for hybridization and screening. One positive full length clone (1400 nucleotides) was identified and both strands were sequenced completely. The clone encodes a protein highly homologous to the human EF-1 γ (EMBL accession no. Z11531) with 92% identity in the nucleotide sequence. Both the human and rabbit EF-1 γ cDNA encode a polypeptide of 437 amino acids; the amino acid identity is 98%. The nucleotide sequence contains the AUG translational start codon at position 11 in the Kozak consensus sequence ACCAUGG (6). The degree of identity of the rabbit EF-1 γ polypeptide to *Artemia* EF-1 γ is 60.7% and 76.1% with *Xenopus* EF-1 γ . When conservative replacements are included in the calculation, the similarity is 76% and 87%, respectively. Thus, comparison of the amino acid sequences for *Artemia*, *Xenopus*, human and rabbit EF-1 γ shows that EF-1 γ is highly conserved in animals (Figure 1).

Xenopus and rabbit EF-1 γ , but not *Artemia*, are phosphorylated by a cell division-controlled protein kinase, p34cdc2 (7). These results are compatible with the existence of putative phosphorylation sites for p34cdc2 kinase in rabbit and *Xenopus*, but not *Artemia* EF-1 γ . Putative phosphorylation sites in *Xenopus* for p34cdc2 kinase are at positions 46 (KTPE) and 230 (ETPK) (4). Since the recognition sequence for p34cdc2 kinase is a proline residue immediately following a serine or threonine residue (8), rabbit and human EF-1 γ appear to have one additional putative phosphorylation site at position 88 (STPE), with RTPE at position 46 and DTPR at position 230.

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Rab	MAAGT	LYTYP	ENWRA	FKALI	AAQYS	GAQVR	VLSAP	PHFHF	GQTNR	TPEFL	50
Hum											50
Xen	..G..		D....	Y.P..		.FPIK	.A.SA	.E.Q.	.V..K		50
Art	.V..K	.....	.F..	.....	.....	..KLE	IAK..	--V..	E..K	SDA..	47
Rab	RKPPA	GKPPA	FEGDD	GFCVF	ESNAI	AYYVS	NEELR	GSTPE	AAAQV	VQWVS	100
Hum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Xen	K...L	.....	..K..	..S..	.H..G	.D...	.T..RL	HQ...	I....	.....	100
Art	KS..L	.....	..SA.	.H..IA	.....	..A	..T...	..SDL	EK..I	I..MT	97
Rab	FADSD	IVPPA	STWVF	PTLGI	MHHNK	QATEN	AKEEV	KRILG	LLDAH	LKTRT	150
Hum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150
Xen	.S..H	.....	..A...	.....	..QY..	..Q	..GI	TV..	V..S	..Q...	150
Art	..TE	.L.AS	C....	..V...	..QF..	..AR	..DI	DKA.Q	A..D	..L...	147
Rab	FLVGE	RVTLA	DITVV	CTLIN	LYKQV	LEPSF	QAAPP	NTNRN	PLTCT	NQPFQ	200
Hum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Xen	.....	..I...	..T	..S...	.....	..P.G	..VT..	..V..V	..E...	.....	200
Art	Y....	..I...	..V.T	..H	..QH.	..DEA	..KSYV	.....	..I..L	..K.V	197
Rab	RAVLG	EVKLC	EKMAQ	FDAKK	FAESQ	PKKDT	PRKEK	GSREE	KQ-KP	QAERK	249
Hum	.....	.....	.....	.....	..T...	.....	.....	.....	.....	.....	249
Xen	.....	.....	D....	.....	..M...	..E	..K...	PAK.P	K--E	KE.K	248
Art	K..I	DF...	..AGE	..P..	Y..F	AAIGS	GE.K	TEKAP	.AV.A	KP.K	247
Rab	EEKKA	AAPAP	EEEMD	ECEQA	LAAEP	KAKDP	FAHLP	KSTVF	LDEPK	RKYS-	298
Hum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	298
Xen	KAAPT	P....	..DDL	..S.K	.....	..S...	Y....	..S.I	M....	.....	297
Art	..VP-	--KEQ	..PAD	AA.E	.....	..S...	..DEM	..G..N	M.D.	..F..N	294
Rab	NEDTL	SVALP	YFNEH	FDKDG	WSLMY	AEYRF	PEELT	QTPMS	CNLT	GMFQR	348
Hum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	348
Xen	.....	.....	.....	..E	..I...	..K	.....	.....	.....	.....	347
Art	..E.K	I--	.....	..K	..EN	Y.I..	S..XY	QD..A	KVY..	.....	342
Rab	LDKLR	KNAPA	SVILF	GTNNS	SSISG	IWVFR	GQELA	FPLSP	DMQVD	YESYT	398
Hum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	398
Xen	.....	..TG..	.....	..N	.....	..V...	..D...	..T..E	..I...	..N	397
Art	IE..M	..Q...	..CV.	..ED.D	.....	..W...	..D...	..K...	..I...	..D	392
Rab	WRKLD	PSSEE	TQTLV	REYFA	WEGAF	QHVKG	AFNQG	KVFK	.....	.....	437
Hum	.....	..G...	.....	.....	..S	.....	.....	.....	.....	.....	437
Xen	.....	..SG..	.....	..CK...	..K...	..E	..KN...	..P...	.....	.....	436
Art	..K...	..DAQ.	..KD..	..TQ..T	..T.T-	..DKQ	..R	..K...	..I...	.....	430

Figure 1. Comparison of the amino acid sequence of rabbit, human, *Xenopus* and *Artemia* EF-1 γ . Conserved amino acids are marked with (.), gaps with (-).

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