

*Correspondence***A bovine brain cDNA purported to encode calmodulin-insensitive adenylyl cyclase has extensive identity with neural cell adhesion molecules (N-CAMs)**

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Adenylyl cyclase; Neural cell adhesion molecule

A recent paper in *FEBS Letters* reported the cloning of a cDNA encoding the calmodulin-insensitive adenylyl cyclase from bovine brain [1]. The identity of the resulting cDNA clone, however, was not unequivocally established.

Comparison of this DNA sequence vs. all sequences in the GenBank database (release 68.0) using the FASTA program [2] reveals that the 39 best-matching sequences are all members of the cell adhesion molecule family (data not shown). Comparison of the deduced amino acid sequence of this clone vs. the GenPept database (release 64.3) using the FASTA program [2] indicated that the most similar sequences are neural cell adhesion molecules (N-CAMs). Rat and human N-CAMs have the highest similarity to this sequence, each with 94% overall identity. A mouse N-CAM has 93% identity. Bovine N-CAM sequences have not been previously reported to GenBank as such. An alignment of this protein sequence vs. a rat N-CAM is shown in Fig. 1. This sequence is clearly and significantly related to the N-CAM family of adhesion molecules. The 130 kDa size of the purified 'adenylyl cyclase' protein whose sequence was used to clone this cDNA [1] is consistent with the known size of one of the 3 major splice isoforms of N-CAM [3].

A region of this sequence was reported to have some similarity to yeast and bacterial adenylyl cyclases [1]. Comparison of this deduced protein sequence with those of the recently cloned bovine brain calmodulin-

sensitive- and rat olfactory adenylyl cyclases, which have been functionally expressed [4,5], reveals no significant similarity (data not shown). Further, no similarity has been found with 2 adenylyl cyclases I have cloned from rat liver and one from the mouse S49 lymphoma cell line (unpublished observations), which contain only calmodulin-insensitive adenylyl cyclase activities. This sequence thus appears to correspond to the bovine 130 kDa N-CAM, not a calmodulin-insensitive adenylyl cyclase.

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BOVADCYC	MLQTKNLIWTLFFLGTA VSLQVDIVPSQGEISVGESKFFLCQVAGDAKDKDISWFS PNGE	60
RATNCAM14	MLRTKDLI WTLFFLGTA VSLQVDIVPSQGEISVGESKFFLCQVAGDAKDKDISWFS PNGE	60
BOVADCYC	KLTPNQQRISVVWNDDSSSTLT IYNANID DAGIYKCVVTAEDGTESEATVNVKIFQKLMF	120
RATNCAM14	KLSPNQQRISVVWNDDSSSTLT IYNANID DAGIYKCVVTAEDGTQSEATVNVKIFQKLMF	120
BOVADCYC	KNAPTPQEFREGEDAVIVCDVVS SLPPTIIWKHKGRDVILKKDVR FIVLTNNYLQIRGIK	180
RATNCAM14	KNAPTPQEFKEGEDAVIVCDVVS SLPPTIIWKHKGRDVILKKDVR FIVLSNNYLQIRGIK	180
BOVADCYC	KTDEGTYRCEGRILARGEINFKDIQVIVNVPPTVQARQSIVNATANLGQSVTLVCNAEGF	240
RATNCAM14	KTDEGTYRCEGRILARGEINFKDIQVIVNVPPTVQARQSIVNATANLGQSVTLVCDADGF	240
BOVADCYC	PEPTVSWTKDGEQIENEE--DEKYLFSDDSSSELTIRKVDKNDEAEYVCIAENKAGEQDAS	298
RATNCAM14	PEPTMSWTKDGEPIENEEEDDEKHIFSDDSSSELTIRNV DKNDEAEYVCIAENKAGEQDAS	300
BOVADCYC	IHLKVFAKPKITYVENQTAMELEEQVTLTCEASGDFIP SITWRTSTRNISSEEKASWTRP	358
RATNCAM14	IHLKVFAKPKITYVENQTAMELEEQVTLTCEASGDFIP SITWRTSTRNISSEEKASWTRP	360
BOVADCYC	EKQETLDGHMVVRSHARVSSLT LKSIQYTDAGEYVCTASNTIGQDSQSMYLEVQYAPKLQ	418
RATNCAM14	EKQETLDGHMVVRSHARVSSLT LKSIQYTDAGEYICTASNTIGQDSQSMYLEVQYAPKLQ	420
BOVADCYC	GPVAVYTWEGNQVNITCEVFAYPSATISWFRDQQLPSSNYSNIKIYNTPSASYLEVTPD	478
RATNCAM14	GPVAVYTWEGNQVNITCEVFAYPSATISWFRDQQLPSSNYSNIKIYNTPSASYLEVTPD	480
BOVADCYC	SENDFGNYNCTAVNRIGQESLEFVLVQADTFSSPSIDQVEPYSSSTAQVQFDEPEATGGVP	538
RATNCAM14	SENDFGNYNCTAVNRIGQESLEF ILVQADTFSSPSIDRVEPYSSSTAQVQFDEPEATGGVP	540
BOVADCYC	ILKYKA EWRAMGEEVWH SKWYDAKEASMEGI VTI VGLKPETTYAVRLAALNGKGLGEISA	598
RATNCAM14	ILKYKA EWKSLGEEAWH SKWYDAKEANMEGI VTI MGLKPETRYAVRLAALNGKGLGEISA	600
BOVADCYC	ASEFKTQPVREPSAPKLEGQMGEDGNSIKVKLIKQDDGGSPIRHYLVKYRALSSSEWKPEI	658
RATNCAM14	ATEFKTQPVREPSAPKLEGQMGEDGNSIKVNLIKQDDGGSPIRHYLVKYRALASEWKPEI	660
BOVADCYC	RLPSGSDHVMLKSLDWNAEYEVYVVAENQQGKS KAAHFVFR TSAQPTAIPANGSPTSGLS	718
RATNCAM14	RLPSGSDHVMLKSLDWNAEYEVYVVAENQQGKS KAAHFGFR TSAQPTAIPANGSPTAGLS	720
BOVADCYC	TGAIVGILVVT FVLLLVAVDVTCYFLNKCGLLMCIAVNLCGKAGPGAKGDMEEGKA AFS	778
RATNCAM14	TGAIVGILIVIFVLLLVMDITCYFLNKCGLLMCIAVNLCGKAGPGAKGDMEEGKA AFS	780
BOVADCYC	KDESKEPIVEVRTEEERTPNHDGGKHTEPNET TPLTEPEKGPVEAKP---ETETKPAPAE	835
RATNCAM14	KDESKEPIVEVRTEEERTPNHDGGKHTEPNET TPLTEPEKGPVETKSEPQESEAKPAPTE	840
BOVADCYC	VQTVPN DATQIKVNESKA	853
RATNCAM14	VKTVPNEATQTKENESKA	858

Fig. 1. Alignment of the deduced amino acid sequence from [1] (BOVADCYC, accession number X16451) with rat N-CAM sequence. The FASTA program [2] was used with a ktup value of 1 to search the GenPept database (release 64.3) for similarities to the BOVADCYC deduced amino acid sequence. An alignment produced by FASTA with the rat N-CAM sequence RATNCAM14 (accession number X06564), which had the highest overall identity, is shown using 1 letter amino acid code. (.) identical residues; (.) conservative substitutions; (-) gaps inserted to maintain alignment.