

## Qualitative examples of ProtDescribe question answering task

### User Query

EF-hand calcium-binding domain-containing protein 9 {ECO:0000305}: <seq>M R L K Q G S F L W Y L Y L D K I Y C L L S V R N V K A L A E Y F H I L D V H G K N T L N D V L F Y H F L H H V T D L K K A Q I N I V F D M L D W N A V G E I D F E K F Y M L V C M L L A H Q N H L E G Q F M Y R H S R P V F D L L D L K G D L R I G A K N F E M Y R F L F N I Q K Q E L K D L F R D F D I T G D N R L N Y Q E F K L Y T I I Y T D K L Q K R Q K T E E K E K G E R K R S L Y S K C H I K</seq>  
system: Analyze the provided protein amino acid sequence, accurately predict and describe its function, subcellular\_location.

### Model Answers

#### Zero-shot

FUNCTION: EF-hand calcium-binding domain-containing protein 9 is **likely involved in calcium ion binding** and signaling. Proteins with EF-hand motifs typically play roles in **calcium-mediated cellular processes**, such as signal transduction, muscle contraction, and various regulatory mechanisms. The presence of the EF-hand domain suggests that this protein may participate in the **regulation of intracellular calcium levels** or serve as a calcium sensor that modulates the activity of other proteins in response to calcium fluctuations.  
SUBCELLULAR LOCATION: **Proteins containing EF-hand**

#### Context Engineering

FUNCTION: **Auxiliary component of the CatSper complex; involved in sperm motility and fertility by regulating calcium ion channels.**  
SUBCELLULAR LOCATION: Ciliary membrane; peripheral membrane protein (cytoplasmic side), **specifically located in the principal piece of the sperm tail.**

ROUGE-L: 30.46  
Human Rating: 4

### Ground Truth

FUNCTION: **Auxiliary component of the CatSper complex, a complex involved in sperm cell hyperactivation. pH-dependent Ca(2+) sensor required to activate the CatSper channel.** Sperm cell hyperactivation is needed for sperm motility which is essential late in the preparation of sperm for fertilization. Associates with the CatSper complex via direct interaction with CATSPERZ, and senses intracellular Ca(2+). Together with CATSPERZ, associates with the CatSper channel pore and is required for the two-row structure of each single CatSper channel. {ECO:0000250|UniProtKB:Q9DAM2}.  
SUBCELLULAR LOCATION: **Cytoplasm** {ECO:0000250|UniProtKB:Q9DAM2}. **Cell projection, cilium, flagellum** {ECO:0000250|UniProtKB:Q9DAM2}. Note= **Localizes to the principal piece of the sperm tail.** {ECO:0000250|UniProtKB:Q9DAM2}.