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SUP-9 and SUP-18 may be components of a K+ channel involved in the regulation of muscle contraction

I Perez de la Cruz[1], SC Cannon[2], HR Horvitz[1]

[1] HHMI, Dept. Biology, MIT, Cambridge, MA 02139.
[2] Dept. Neurobiology, Harvard Medical School, Boston, MA 02114, USA.

Rare altered-function mutations in the genes *unc-93*, *sup-9*, or *sup-10* result in the abnormal regulation or coordination of muscle contraction (e.g., Levin, J. and Horvitz, H.R. Genetics 135, 53-70, 1992). These mutants move sluggishly, are unable to lay eggs, and exhibit the rubber-band phenotype: when worms are prodded on the head, they contract and relax along their entire body without moving backwards. Genetic studies suggest these three genes act at the same step, possibly by encoding subunits of a protein complex. Loss-of-function mutations in a fourth gene, *sup-18*, completely suppress the rubber-band phenotype caused by *sup-10(n983)* and partially suppress the *unc-93(gf)* and *sup-9(gf)* rubber-band phenotypes. *unc-93* and *sup-10* encode novel putative transmembrane proteins.

We have found that *sup-9* encodes a member of the TWIK family of K^+ channels. We have injected *sup-9*, *unc-93*, and *sup-10* cRNAs into *Xenopus* oocytes but have not detected K+ selective currents. We are currently expressing *sup-9* singly or with *unc-93* and *sup-10* in HEK cells in an attempt to reconstitute a functional channel complex. To better understand the structure-function relationship of TWIK K^+ channels we are determining the sequences of the approximately 100 alleles of *sup-9*. We have also raised antibodies against SUP-9 to determine its in vivo localization.

We have cloned *sup-18* and found that it encodes a putative membrane protein. Interestingly, SUP-18 is distantly related by sequence to a family of bacterial NADH oxidases. We are currently expressing MBP-SUP-18 fusion proteins in *E. coli* to assay nucleotide binding and dehydrogenase activities. We have raised anti-peptide antibodies against SUP-18 to test whether it colocalizes with SUP-9 *in vivo*.