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# Letter to the Editor

## A Unified Nomenclature for the Superfamily of TRP Cation Channels

The TRP superfamily includes a diversity of non-voltage-gated cation channels that vary significantly in their selectivity and mode of activation. Nevertheless, members of the TRP superfamily share significant sequence homology and predicted structural similarities. Currently, most of the genes and proteins that comprise the TRP superfamily have multiple names and, in at least one instance, two distinct genes belonging to separate subfamilies have the same name. Moreover, there are many cases in which highly related proteins that belong to the same subfamily have unrelated names. Therefore, to minimize confusion, we propose a unified nomenclature for the TRP superfamily.

The current effort to unify the TRP nomenclature focuses on three subfamilies (TRPC, TRPV, and TRPM) that bear significant similarities to the founding member of this superfamily, *Drosophila* TRP, and which include highly related members in worms, flies, mice, and humans (Table 1). Members of the three subfamilies contain six transmembrane segments, a pore loop separating the final two transmembrane segments, and similarity in the lengths of the cytoplasmic and extracellular loops. In addition, the charged residues in the S4 segment that appear to contribute to the voltage sensor in voltage-gated ion channels are not conserved. The TRP-Canonical (TRPC) subfamily (formerly short-TRPs or STRPs) is comprised of those proteins that are the most highly related to *Drosophila* TRP. The TRPV subfamily (formerly OTRPC), is so named based on the original designation, Vanilloid Receptor 1 (VR1), for the first mammalian member of this subfamily (now TRPV1). The name for the TRPM subfamily (formerly long-TRPs or LTRPs) is derived from the first letter of Melastatin, the former name (now TRPM1) of the founding member of this third subfamily of TRP-related proteins. Based on amino acid homologies, the mammalian members of these three subfamilies can be subdivided into several groups each (Table 2 and Figure 1).

The numbering system for the mammalian TRPC, TRPV, and TRPM proteins takes into account the order of their discovery and, in as many cases as possible, the number that has already been assigned to the genes and proteins (Table 2). In the case of the TRPV proteins, the numbering system is also based in part on the groupings of the TRPV proteins. New members of each subfamily will maintain the same root name and, with the exception of TRPV3, will be assigned the next number in the sequence. Currently, TRPV3 is unassigned to maintain the TRPV1/ TRPV2 and TRPV5/TRPV6 groupings and so that the former OTRPC4 could be renamed TRPV4. The next TRPV protein will be designated TRPV3.

We hope this new nomenclature will add clarity to the field and simplify the naming of new members of the TRP superfamily. We recommend that accession numbers be used whenever it is necessary to unambiguously specify a given variant resulting from alternative mRNA splicing. Finally, this nomenclature has been approved by the HUGO Gene Nomenclature Committee and we recommend that this system be used in all future publications concerning TRPC, TRPV, and TRPM subfamily members.

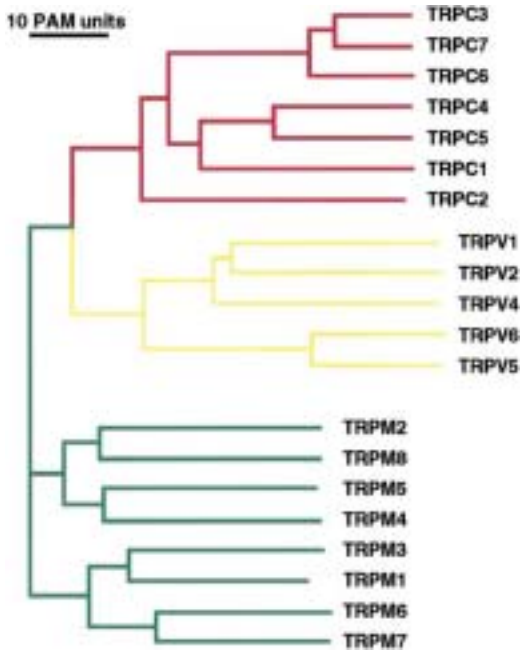


Figure 1. Phylogenetic Tree of the TRP Superfamily

The tree, which was adapted from Clapham et al., 2001 (Nat. Rev. Neurosci. *2*, 387–396), was calculated using the neighbor-joining method and human, rat, and mouse sequences.

Table 1. Number of TRP Genes in Worms (*C. elegans*), Flies (*Drosophila melanogaster*), Mice, and Humans

| Subfamily | Worms | Flies | Mice | Humans |
|---|---|---|---|---|
| TRPC | 3 | 3 | 7 | 6[a] |
| TRPV | 5 | 2 | 5 | 5 |
| TRPM | 4 | 1 | 8 | 8 |

[a] TRPC2 is a pseudogene and is not counted.

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[1] TRP Nomenclature Committee

Table 2. Nomenclature of the Mammalian TRP Superfamily

| Name | Group | Former Names | Accession Numbers |
|---|---|---|---|
| TRPC Subfamily | | | |
| TRPC1 | 1 | TRP1 | CAA61447, AAA93252 |
| | | TRPC1 | |
| TRPC2 | 2 | TRP2 | X89067, AAD17195, AAD17196, AAG29950, AAG29951, AAD31453, |
| | | TRPC2 | CAA06964 |
| TRPC3 | 3 | TRP3 | AAC51653 |
| | | TRPC3 | |
| TRPC4 | 4 | TRP4 | CAA68125, BAA23599 |
| | | TRPC4 | |
| TRPC5 | 4 | TRP5 | AAC13550, CAA06911, CAA06912 |
| | | TRPC5 | |
| TRPC6 | 3 | TRP6 | NP_038866 |
| | | TRPC6 | |
| TRPC7 | 3 | TRP7 | AAD42069, NP_065122 |
| | | TRPC7 | |
| TRPV Subfamily | | | |
| TRPV1 | 1 | VR1 | AAC53398 |
| | | OTRPC1 | |
| TRPV2 | 1 | VRL-1 | AAD26363, AAD26364, BAA78478 |
| | | OTRPC2 | |
| | | GRC | |
| TRPV3 (not assigned) | | | |
| TRPV4 | 2 | OTRPC4 | AAG17543, AAG16127, AAG28027, AAG28028, AAG28029, |
| | | VR-OAC | CAC20703 |
| | | TRP12 | |
| | | VRL-2 | |
| TRPV5 | 3 | ECaC1 | CAB40138 |
| | | CaT2 | |
| TRPV6 | 3 | CaT1 | AAD47636 |
| | | ECaC2 | CAC20416 |
| | | CaT-L | CAC20417 |
| TRPM Subfamily | | | |
| TRPM1 | 1 | Melastatin | AAC13683, AAC80000 |
| TRPM2 | 2 | TRPC7 | BAA34700 |
| | | LTRPC2 | |
| TRPM3 | 1 | KIAA1616 | AA038185 |
| | | LTRPC3 | |
| TRPM4 | 3 | TRPM4 | H18835 |
| | | LTRPC4 | |
| TRPM5 | 3 | MTR1 | AAF26288 |
| | | LTRPC5 | |
| TRPM6 | 4 | Chak2 | AF350881 |
| TRPM7 | 4 | TRP-PLIK | AAF73131 |
| | | Chak1 | |
| | | LTRPC7 | |
| TRPM8 | 2 | TRP-p8 | AC005538 |

Indicated are the suggested gene and protein names, the groups within each subfamily, the former names, and accession numbers.

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