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SAROTUP 2.0: a suite of web tools for finding potential target-unrelated peptides from phage display data

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Phage display has made a great impact on biomedicine field. It has been widely used for epitope mapping, analysis of protein-protein interactions, prediction of drug target, and identification of enzyme substrates and inhibitors. Some phage antibodies and peptides have been approved by FDA as new drugs; others have shown promise for the development of diagnostics, **vaccines**, and the targeted delivery of therapeutics. However, target-unrelated peptides (TUPs) often creep into phage display data. If the data are not cleaned before analysis, the conclusion might be incorrect or even misleading. The web server SAROTUP is short for Scanner And Reporter Of Target-Unrelated Peptides. Its first version was developed in 2010, based on only 23 TUP motifs known till then. At present, SAROTUP has been updated to version 2.0 with a suite of tools for finding potential TUPs and other purposes. Besides the TUPScan, the motif-based tool, three tools based on the MimoDB database, *i.e.*, MimoScan, MimoSearch, and MimoBlast, are integrated into SAROTUP. TUPScan is capable of finding peptides with known TUP motifs. In current version, 26 TUP motifs and 35 TUP sequences are embedded. MimoScan can find peptides with query patterns in the MimoDB database. It can be used to find other peptides in the MimoDB database with known TUP motifs; it can also check how specific the patterns derived from biopanning results are. MimoSearch is capable of finding peptides identical to query sequences in the MimoDB database. When a peptide has various targets to bind, it might be a TUP rather than mimotope. MimoBlast can further find peptides similar to query sequences. Highly similar peptides obtained with various targets might also be TUPs. Besides, this tool can also be used to derive new TUP motifs. The web interfaces of SAROTUP version 2.0 have also been redesigned to be more self-evident and a lot of help information has been embedded into each script or added to the help page. SAROTUP 2.0 is freely available at <http://immunet.cn/sarotup>.