High Affinity Sumo Traps

Background
Small Ubiquitin-like Modifier (or SUMO) proteins are covalently attached to other proteins in cells to modify their function, also called SUMOylation. This is mediated by a multistep enzymatic cascade, similar to ubiquitination. SUMOylation is a dynamic process that can change the subcellular localization, stability, or interaction partners of modified proteins within cells. SUMOylation has been linked to diverse cellular pathways and its deregulation has been linked to many types of disease (inflammation, cancer, cardiovascular disease, etc.). SUMO modulates cellular functions like: 1) Changes in subcellular localization, 2) Alteration of protein-DNA binding affinity, 3) Alteration of protein-protein interaction, 4) Stabilization of target, 5) Promoting proteasomal degradation.
Current Options. Isolation of proteins modified by SUMO can be achieved by the use of 1) antibodies that specifically react with the SUMO protein-target protein conjugates and 2) the overexpression of tagged-SUMO. Both methods have drawbacks including expense, need for expertise, and altered physiology due to need for overexpression or transgenesis.

Technology
Our technology allows the affinity purification of SUMO and SUMO-conjugated proteins by the use of engineered proteins comprising tandem arrangements of SUMO interacting motifs, connected by flexible linkers.

Application
Our high affinity SUMO traps technology can be applied as a molecular trap to isolate the pool of SUMOylated proteins in a given tissue or cell type. It can facilitate the isolation of SUMO- and polySUMO-modifed proteins from cells and tissues for downstream analysis. It could be used as a biological and medical research tool to study SUMOylation during development, progression of disease, or in response to drug treatment. These engineered proteins allow the capture and analysis of SUMOylated proteins in vitro or from cells/tissues, facilitating the study of post-translational mechanisms that connect signaling cascades with effector functions. They may be useful for the development and implementation of novel screens for biomarkers and have potential for diagnostic use.

Advantages
SUMOtraps show a high specificity for SUMOylated proteins, especially those undergoing polySUMOylation. This technology overcomes the need for overexpressed tagged-SUMO, which might alter the SUMOylation equilibrium of the cells, and does not rely on expensive antibodies or complicated isolation protocols. SUMOylated proteins can isolated from patient-derived tissues as well as cellular and animal models.

Patent Status.
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