



# Granulysin

Granulysin is a protease, or an enzyme, that breaks down proteins of a specific sequence. This is an active that can be delivered in a cream or lotion to provide slow but consistent exfoliation. It will keep pores open, preventing the formation of comedos. Furthermore, Granulysin has antibacterial activity which will help treat and prevent acne. At Skin Actives we produce near-pharmaceutical quality Granulysin, which is suited specifically for skin care applications. This means that we can offer excellent quality at reasonable prices.

## Applications

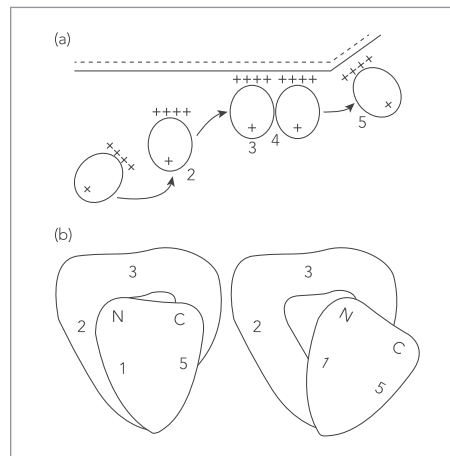
- Anti-bacterial
- Recruits immune cells, increases immune response

## Use

- We suggest a final concentration of Granulysin of 0.05 to 0.2% (w/v).
- Avoid extremes of pH, and add Granulysin at the final stage, when the product is cool.
- Addition of saline solution or mixing the Granulysin suspension with the serum, lotion or gel will activate the enzyme.

## Function

Granulysin is a member of lysosomal proteins (saposins-like) that function as activator of various lysosomal lipid-degrading enzymes. Granulysin is expressed by activated human killer cells and T-lymphocytes and it exhibits activity against Gram-positive and Gram-negative bacteria and fungi. Granulysin is a protein of small molecular weight that can be delivered in a cream or lotion. One of the advantages of this particular protein is that it will help keep the acne bacteria, *Propionibacterium acnes*<sup>1</sup>, at bay.



Granulysin is a protein that exists in 9 and 15 kDa forms<sup>2</sup> and it is released by T cells when they are attached to infected cells. Granulysin works by creating holes in the target cell membrane and destroying it. Granulysin is broadly antimicrobial<sup>3,4</sup>.

Figure 2: Schematic diagrams of granulysin action. (a) Ellipses represent Granulysin molecules, with a cluster of positive charges (+++), and more positive charges distributed elsewhere. The charge cluster of the Granulysin molecule in solution (1) orients the molecule (2) towards the negatively charged surface of the bacterial cell (line with dashes). The arginine residues bind surface charges (3). The Granulysin molecules could cluster at the cell surface (4). Granulysin lyses the membrane (5), possibly rolling the granulysin in the direction of the lytic surfaces of helices 1, 2, and 3. (b) The lysis process could involve a scissors motion enabled by the internal voids further exposing lytic surface.

## Technical Information

<p>INCI: Molecular Weight: Purity: Formulation: Production: Optimal Concentration: Storage: Reconstitution:</p>	<p>Granulysin (applied to CTFA). Antimicrobial (Non-Antibiotic) agent. 8,700, containing 74 amino acids. Purity is greater than 95% as determined by analysis using SDS-PAGE. Suspension in ammonium sulfate (80% saturation). Produced in <i>E. coli</i> and purified using proprietary chromatographic techniques. Should be determined for each specific application. This suspension is stable at 2-8°C. Do not freeze. Add buffered (pH 7.5) saline solution (about 1:5 to 1:10) to the protein suspension to re-dissolve Granulysin.</p>
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### References

- 1 Anderson, DH, Sawaya, MR, Cascio, D., Ernst, W., Modlin, R., Krensky, A and Eisenberg, D. (2003) Granulysin Crystal Structure and a Structure-derived Lytic Mechanism *J. Mol. Biol.* 325: 355-365
- 2 Duong, BT, Khandabi, D, Modlin, RL, Kim, J (2002) Granulysin has antimicrobial activity against *propionibacterium acnes* *J. Inv. Dermatology*, 119: 327
- 3 Ernst, W.A., et al., Granulysin, a T cell product, kills bacteria by altering membrane permeability. *J Immunol*, 2000. 165: 7102-8.
- 4 Gansert, J.L., Kiebler, F., Engele, M., Wittke, F., Rölinghoff, M., Krensky, A.M. Porcelli, S.A., Modlin, R.L. Stenger, S.: Human NKT cells express granulysin and exhibit antimycobacterial activity. (2003) *J. Immunol.* 170 : 3154-3161.
- 5 Stenger, S., Hanson, D. A., Teitelbaum, R., et al. (1998) An antimicrobial activity of cytolytic T cells mediated by granulysin, *Science*, 282, 121-125.