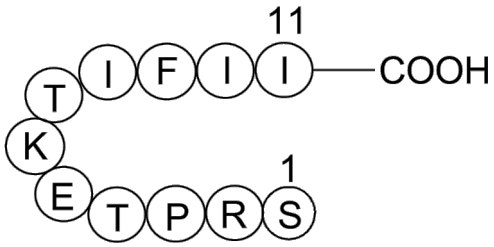
Product Data Sheet

Product Name: Gap 27
Cat. No.: GP10119

Chemical Properties

Cas. No.	198284-64-9		
Chemical Name	Gap 27		
SMILES	CCC(C)C(C(=O)NC(C(C)CC)C(=O)O)NC(=O)C(CC1=CC=CC=C1)NC(=O)C(C(C)CC)NC(=O)C(C(C)O)NC(=O)C(CCCCN)NC(=O)C(CCC(=O)O)NC(=O)C(C(C)O)NC(=O)C2CCCN2C(=O)C(CCCN=C(N)N)NC(=O)C(CO)N		
Formula	$C_{60}H_{101}N_{15}O_{17}$	M.Wt	1304.55
Solubility	≥65.25mg/mL in DMSO, ≥5mg/mL in Water	Storage	Desiccate at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		

Structure



Protocol

Cell experiment [1]:

Cell lines Osteoclasts

Product Data Sheet

Preparation Method	Mechanically harvested osteoclasts from the long bones of 1 or 2-day-old Sprague-Dawley rat pups were allowed to attach to sonicated bovine cortical bone slices (0.5cm^2). After 30min, the non-attached cells were rinsed away, and the remaining cells on the bone slices were cultured in three groups: control, heptanol and Gap 27. The control group was cultured in DMEM (Dulbecco's modified Eagle's medium) buffered with 20mM Hepes and containing 0.84g of sodium bicarbonate/liter, 2mM L-glutamine, 100 IU of penicillin/ml, 100µg of streptomycin/ml and 7% heatinactivated fetal calf serum (FCS), which medium will be later referred to as DMEM-FCS. The heptanol group was cultured in medium with 0.15% ethanol and 3mM heptanol in DMEM-FCS. Third group of bone cells, Gap 27 peptide group, was cultured with Gap 27 peptide at concentration 500µM in DMEM-FCS. In all the three groups cells were cultured for 48h, after which the cultures were stopped by fixing the cells and bone slices with freshly made or refrigerated 3% paraformaldehyde (PFA) and 2% sucrose in PBS for 10min at room temperature. The cells were stained for tartrate-resistant acid phosphatase (TRAP), a commonly accepted marker of osteoclasts, using a TRAP kit according to the manufacturer's instruction.
Reaction Conditions	500µM; 48h
Applications	Gap 27 caused a remarked decrease in the number of both TRAP-positive mononuclear and multinucleated rat osteoclasts cultured on bovine bone slices.

Animal experiment [2]:

Animal models	Sprague-Dawley rats

Product Data Sheet

Preparation Method	Highoutput heart failure was induced by volume overload using the arterio-venous fistula model (AV-Shunt) in adult male rats. Four weeks after AV-Shunt surgery, the Cx43 mimetic peptide Gap 27 (1μg/kg) or scrambled peptide, were administered via osmotic minipumps (AV-ShuntGap 27 or AV-ShuntScr) for 4 weeks. Cardiac volumes, arrhythmias, function and remodeling were determined at 8 weeks after AV-Shunt surgeries.
Dosage form	1μg/kg; 4 week; osmotic minipumps
Applications	Gap 27 treatment significantly slowed the progression of cardiac deterioration in rats, and intraventricular pressure-volume loop measurements showed a significant improvement in cardiac function.

References:

[1] Ilvesaro J, Tavi P, Tuukkanen J. Connexin-mimetic peptide Gap 27 decreases osteoclastic activity[J]. BMC musculoskeletal disorders, 2001, 2(1): 10.
[2]Lucero C M, Andrade D C, Toledo C, et al. Cardiac remodeling and arrhythmogenesis are ameliorated by administration of Cx43 mimetic peptide Gap27 in heart failure rats[J]. Scientific Reports, 2020, 10(1): 6878.

Background

Gap 27 is a peptide (Ser-Arg-Pro-Thr-Glu-Lys-Thr-Ile-Phe-Ile-Ile) derived from connexin43 (Cx43) and is a selective gap junction blocker[1, 2]. Gap 27 specifically acts on this protein by mimicking a part of the Cx43 structure, thereby inhibiting intercellular communication mediated by Cx43[3]. Gap junctions are channel structures on adjacent cell membranes that allow small molecules to be directly transferred between cells and are essential for coordinating cell group activities[4].

In vitro, Gap 27 (500μM) treatment of rat osteoclasts cultured on bovine bone slices for 48h significantly reduced the survival rate of osteoclasts and the number of TRAP-positive mononuclear

and multinuclear rat osteoclasts[5]. Gap 27 (0.1mM) treatment of primary human corneal epithelial cells (HCEC) enhanced wound closure of HCEC in vitro[6].

In vivo, Gap 27 (1μg/kg) treated with osmotic micropumps for 4 weeks in rats with an arteriovenous fistula model (AV-Shunt) significantly slowed the progression of cardiac function deterioration and significantly improved cardiac function in rats[7].

References:
[1] De Vuyst E, Boengler K, Antoons G, et al. Pharmacological modulation of connexin-formed channels in cardiac pathophysiology[J]. British journal of pharmacology, 2011, 163(3): 469-483.
[2] Sathiyanadan K, Alonso F, Domingos-Pereira S, et al. Targeting endothelial Connexin37 reduces angiogenesis and decreases tumor growth[J]. International journal of molecular sciences, 2022, 23(6): 2930.
[3] Ribeiro-Rodrigues T M, Martins-Marques T, Morel S, et al. Role of connexin 43 in different forms of intercellular communication–gap junctions, extracellular vesicles and tunnelling nanotubes[J]. Journal of cell science, 2017, 130(21): 3619-3630.
[4] Maeda S, Tsukihara T. Structure of the gap junction channel and its implications for its biological functions[J]. Cellular and Molecular Life Sciences, 2011, 68(7): 1115-1129.
[5] Ilvesaro J, Tavi P, Tuukkanen J. Connexin-mimetic peptide Gap 27 decreases osteoclastic activity[J]. BMC musculoskeletal disorders, 2001, 2(1): 10.
[6] Elbadawy H M, Mirabelli P, Xeroudaki M, et al. Effect of connexin 43 inhibition by the mimetic peptide Gap27 on corneal wound healing, inflammation and neovascularization[J]. British journal of pharmacology, 2016, 173(19): 2880-2893.
[7] Lucero C M, Andrade D C, Toledo C, et al. Cardiac remodeling and arrhythmogenesis are ameliorated by administration of Cx43 mimetic peptide Gap27 in heart failure rats[J]. Scientific Reports, 2020, 10(1): 6878.