# Product Data Sheet

Product Name: Gap19
Cat. No.: GC17681

## Chemical Properties

| | | | |
|---|---|---|---|
| Cas. No. | 1507930-57-5 | | |
| SMILES | CC[C@]([C@@](/N=C(O)/[C@](/N=C(O)/[C@](/N=C(O)/[C@](/N=C(O)/[C@](N)([H])CCCCN)([H])CCC(O)=N)([H])[C@@](CC)([H])C)([H])CCC(O)=O)([H])/C(O)=N/[C@@](/C(O)=N/[C@@](/C(O)=N/[C@@](/C(O)=N/[C@@](C(O)=O)([H])CCCCN)([H])CC1=CC=CC=C1)([H])CCCCN)([H])CCCCN)([H])C | | |
| Formula | $C_{55}H_{96}N_{14}O_{13}$ | M.Wt | 1161.45 |
| Solubility | ≥ 58.0725mg/mL in Water | Storage | Store at -20°C |
| General tips | For obtaining a higher solubility , please warm the tube at 37 ℃ and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20℃ 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 | Gap19 | | |

## Protocol

### Cell experiment [1]:

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|---|---|
| Cell lines | Astrocyte cell |
| Preparation Method | Concentration-dependent inhibition by Gap19 (30 min pre-incubation) of ATP release in cultured cortical astrocytes triggered by glutamate. |
| Reaction Conditions | 0-104uM Gap19 for 30 min |


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|---|---|
| Applications | Gap19 (30 min treatment) inhibited glutamate-triggered ATP release (Figure 2A).Etd+ uptake was inhibited in the presence of Gap19 in a dose-dependent manner, with the peptide applied prior to (30 min) and during Etd+ uptake.Gap19 was without any effect on gap junctional communication in astrocytes which in culture express only Cx43. |

**Animal experiment [2]:**

| | |
|---|---|
| Animal models | Male ICR mice (25-30 g) |
| Preparation Method | Animals were randomly divided into different groups as follows: (I) vehicle group (sham); (II) Gap19 treated vehicle group (Gap19 group); (III) I/R group; (IV) Gap26 treated I/R group (I/R + Gap26 group); (V) Gap19 treated I/R group (I/R + Gap19 group).10 μg Gap19/Gap26 in 10 μl ddH2O was injected in lateral ventricle (300 μg/kg body weight, i.c.v.). TAT-Gap19 was administered at a dose of 25 mg/kg body weight (i.p.) in the post-treatment groups. |
| Dosage form | 10 μg Gap19 |


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| Applications | When investigated the role of Gap19 on cerebral ischemia/reperfusion (I/R) injury in a mouse model of middle cerebral artery occlusion (MCAO). Ventricle-injected Gap19 significantly alleviated infarct volume, neuronal cell damage and neurological deficits after ischemia, the neuroprotective effect of Gap19 was significant stronger than Gap26. Post-treatment with TAT-Gap19 still provided neuroprotection when it was administered intraperitoneally at 4 h after reperfusion. |


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References:

[1]. Abudara V, Bechberger J, et,al. The connexin43 mimetic peptide Gap19 inhibits hemichannels without altering gap junctional communication in astrocytes. Front Cell Neurosci. 2014 Oct 21;8:306. doi: 10.3389/fncel.2014.00306. PMID: 25374505; PMCID: PMC4204617.
[2].Chen B, Yang L, et,al. Inhibition of Connexin43 hemichannels with Gap19 protects cerebral ischemia/reperfusion injury via the JAK2/STAT3 pathway in mice. Brain Res Bull. 2019 Mar;146:124-135. doi: 10.1016/j.brainresbull.2018.12.009. Epub 2018 Dec 26. PMID: 30593877.

## Background

Gap19 (KQIEIKKFK) blocks HCs but not GJCs and is specific for Cx43. Gap19 may resist myocardial ischemic injury[2]. Gap19 has a bimodal effect on Cx43 HC gating, decreasing gating to the fully open state while increasing substate gating, suggesting that Gap19 acts like a gating modifier on Cx43 HC.Gap19 disrupts the CT-CL interaction, thus making hc difficult to open[7].

Gap19, as a nonapeptide derived from the cytoplasmic loop of Cx43, inhibits astroglial Cx43 hemichannels in a dose-dependent manner, without affecting gap junction channels. This peptide, which not only selectively inhibits hemichannels but is also specific for Cx43[5].

## Product Data Sheet

When investigated the role of Gap19 on cerebral ischemia/reperfusion (I/R) injury in a mouse model of middle cerebral artery occlusion (MCAO). Ventricle-injected Gap19 significantly alleviated infarct volume, neuronal cell damage and neurological deficits after ischemia, the neuroprotective effect of Gap19 was significant stronger than Gap26. Post-treatment with TAT-Gap19 still provided neuroprotection when it was administered intraperitoneally at 4 h after reperfusion[1]. Gap19 exerted a neuroprotective effect after stroke via inhibition of the TLR4-mediated signaling pathway[4]. Treatment with Gap19 prevented metabolic inhibition-enhanced hemichannel openings, protected cardiomyocytes against volume overload and cell death following ischemia/reperfusion in vitro and modestly decreased the infarct size after myocardial ischemia/reperfusion in mice in vivo[3]. Intra-TG injection of the mimetic peptide GAP19, which inhibits Cx43 hemichannel formation, greatly reduced TMJ-evoked MMemg activity in all CFA-inflamed groups, while activity in sham groups was not affected[6].

References:

[1]. Chen B, Yang L, et,al. Inhibition of Connexin43 hemichannels with Gap19 protects cerebral ischemia/reperfusion injury via the JAK2/STAT3 pathway in mice. Brain Res Bull. 2019 Mar;146:124-135. doi: 10.1016/j.brainresbull.2018.12.009. Epub 2018 Dec 26. PMID: 30593877.

[2]. Wang JP, Yang ZT, et,al. L-carnosine inhibits neuronal cell apoptosis through signal transducer and activator of transcription 3 signaling pathway after acute focal cerebral ischemia. Brain Res. 2013 Apr 24;1507:125-33. doi: 10.1016/j.brainres.2013.02.032. Epub 2013 Feb 27. PMID: 23454231.

[3]. Wang N, De Vuyst E, et,al. Selective inhibition of Cx43 hemichannels by Gap19 and its impact on myocardial ischemia/reperfusion injury. Basic Res Cardiol. 2013 Jan;108(1):309. doi: 10.1007/s00395-012-0309-x. Epub 2012 Nov 8. PMID: 23184389; PMCID: PMC3666173.

[4]. Chen Y, Wang L, et,al. Inhibition of Connexin 43 Hemichannels Alleviates Cerebral Ischemia/Reperfusion Injury via the TLR4 Signaling Pathway. Front Cell Neurosci. 2018 Oct 17;12:372. doi: 10.3389/fncel.2018.00372. PMID: 30386214; PMCID: PMC6199357.

[5]. Abudara V, Bechberger J, et,al. The connexin43 mimetic peptide Gap19 inhibits hemichannels without altering gap junctional communication in astrocytes. Front Cell Neurosci. 2014 Oct 21;8:306. doi: 10.3389/fncel.2014.00306. PMID: 25374505; PMCID: PMC4204617.


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[6]. Ahmed F, Rahman M, et,al. Role of Connexin 43 in an Inflammatory Model for TMJ Hyperalgesia. Front Pain Res (Lausanne). 2021 Aug 3;2:715871. doi: 10.3389/fpain.2021.715871. PMID: 35295418; PMCID: PMC8915650.
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