

## Product Information

### Monosialoganglioside G<sub>M1</sub> from bovine brain

Catalog Numbers **G7641**, **G9652** ( $\gamma$ -irradiated),  
**G4526** (pyrene labeled)

Storage Temperature  $-20\text{ }^{\circ}\text{C}$

CAS RN: 37758-47-7 (Monosialoganglioside G<sub>M1</sub>)

#### Product Description

This complex natural product is a mixture of compounds with undefined molecular weights. An approximate molecular weight of 1,540 has been calculated based on the following assumptions:

1. The sphingosyl chain is normal.
2. Stearic acid is the only fatty acid linked to the sphingosyl amino group.
3. Only acetyl (not glycolyl) residues are bound to the sugar amino group.

Structure:

Gal $\beta$  (1 $\rightarrow$ 3)/GalNAc $\beta$  (1 $\rightarrow$ 4)[Neu5Ac $\alpha$  (2 $\rightarrow$ 3)]Gal  $\beta$   
(1 $\rightarrow$ 4)GlcCer.

The structure for G<sub>M1</sub> is also indicated as G<sub>M1a</sub>. G<sub>M1a</sub> is the structure found in mammalian brain and is generally referred to as G<sub>M1</sub>.<sup>1</sup>

Monosialoganglioside G<sub>M1</sub> is a major sialoglycolipid of neuronal membranes that modulates calcium homeostasis.<sup>2</sup> It binds to cholera toxin B subunit, resulting in stimulation of adenylate cyclase in a wide variety of cell types.<sup>3</sup> After cholera toxin binds to membrane associated monosialoganglioside G<sub>M1</sub>, the A subunit of cholera toxin is translocated to the cell interior, where it catalyzes the ADP ribosylation of the membrane associated Gs subunit of adenylate cyclase.<sup>4</sup> In addition, binding of cholera toxin to monosialoganglioside G<sub>M1</sub> causes translocation of NF- $\kappa$ B and activation of dendritic cells.<sup>5</sup>

Monosialoganglioside G<sub>M1</sub> was one of many mono- and oligosaccharide ligands studied for their affinity for NKR-P1, a membrane protein on natural killer cells, which contains an extracellular Ca<sup>2+</sup>-dependent lectin domain.<sup>6</sup> Monosialoganglioside G<sub>M1</sub> is effective in partially correcting the consequences of neuroinjury in a number of *in vivo* and *in vitro* model systems.<sup>7</sup>

Accumulation of G<sub>M1</sub>, caused by a defect of acid hydrolases, leads to the G<sub>M1</sub> gangliosidosis, which is a lethal lysosomal disease.<sup>8</sup> It was also found to have a regulatory role in amyloid precursor protein processing pathways associated with Alzheimer's disease<sup>9</sup> and possible involvement in the pathogenesis of demyelination in relapsing-remitting multiple sclerosis.<sup>10</sup>

Neuraminidase from *Arthrobacter ureafaciens* has a 100-fold higher specificity for the sialidase-resistant ganglioside G<sub>M1</sub> than the sialidase from *C. perfringens*. In the absence of detergents, neuraminidase showed very low activity, but with sodium cholate at 3 times the G<sub>M1</sub> molar concentration, the hydrolysis was most effective.<sup>11</sup>

The fluorescent monosialoganglioside G<sub>M1</sub>-pyrene labeled was used to monitor interactions between cholera toxin and its receptor.<sup>12,13</sup>

Monosialoganglioside G<sub>M1</sub> is prepared by a modification of a published procedure.<sup>14</sup> It is isolated from bovine brain by extraction and solvent fractionation methods. The final purification is done by HPLC on silica gel allowing no buffer salts to be used for the purification.

The recommended TLC spray reagent for detection on silica gel plates is the naphthoresorcinol-sulfuric acid spray for sugars.<sup>15</sup>

#### Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

#### Preparation Instructions

Gangliosides, including monosialoganglioside G<sub>M1</sub>, are soluble in dimethylformamide, tetrahydrofuran, methanol and insoluble in non-polar solvents. Gangliosides form micelles in aqueous solution.<sup>16</sup>

### Storage/Stability

Monosialoganglioside G<sub>M1</sub> is stable in methanol for a few days at room temperature, several weeks in the refrigerator and months in the freezer.

### References

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