**MEDIA RELEASE**

# Hong Kong Department of Health approves SPINRAZA (nusinersen), the first treatment for spinal muscular atrophy

## Nine SMA patients in Hong Kong receiving free treatment under Biogen's pre-approval Expanded Access Program

**Hong Kong, 2 October 2018** – The Hong Kong Department of Health (DOH) has granted registration approval for SPINRAZA (nusinersen) for the treatment of Spinal Muscular Atrophy (SMA), a leading genetic cause of death in infants and toddlers that is marked by progressive, debilitating muscle weakness.

In response to the need for treatment for individuals living with SMA, Biogen sponsored the pre-approval Expanded Access Program (EAP) for SPINRAZA in Hong Kong free of charge in May 2018. The EAP has led to the initiation and continuation of treatment for nine eligible individuals with infantile-onset SMA (Type 1) in Hong Kong. As with similar programs in other parts of the world, the EAP in Hong Kong will cease after DOH approval of SPINRAZA in Hong Kong. This means no new cases will be initiated under the EAP, but patients already in the program will continue to receive the treatment free of charge until the Hong Kong government-initiated SPINRAZA access arrangement is ready in December 2018.

"The DOH approval marks the availability of SPINRAZA for prescription in Hong Kong. Based on the robust efficacy and safety profile demonstrated in the clinical trials in a broad range of individuals with SMA, we believe SPINRAZA will have a meaningful impact on infants, children and adults living with this devastating disease in Hong Kong," said Mr. Francis Wan, President of APAC ex Japan of Biogen "As part of our mission to improve the lives of those affected by SMA, we will continue to work with the Hong Kong government and the Hospital Authority to ensure people who could benefit from SPINRAZA receive access to this important treatment as quickly as possible."

SMA is a rare genetic disease that can have a devastating and life-changing impact.[i] In its most severe forms, affecting young babies and children, SMA can cause paralysis and difficulty with the most basic functions of life, like breathing and swallowing. Children with SMA may not hit major motor milestones other children without the disease will (i.e. rolling, sitting, crawling, standing or walking).[ii]

There are four known forms of SMA – Type 1, Type 2, Type 3 and Type 4 – each determined by the age of onset (from those diagnosed before six months of age to those diagnosed in adulthood) and the physical milestones achieved.[i]

Results demonstrate that treatment with SPINRAZA provides benefit across disease types, and supports the initiation of treatment as soon as possible following diagnosis.[i]

A snapshot of the clinical trial results:

- **Infantile onset SMA (individuals most likely to develop Type 1 SMA)** – SPINRAZA helps increase survival: 63% reduction in mortality risk (p=0.0041) and 47% reduction in mortality risk or permanent ventilation (p=0.0046) in patients.[iii] SPINRAZA also helps achieve improvements in motor milestones over 13 months: 51% of patients achieved pre-specified motor milestone improvement (p<0.0001; HINE section 2), including head control, rolling and sitting.[ii,iii]

- **Later onset SMA (individuals most likely to develop Type 2 or 3 SMA)** – SPINRAZA provides sustained improvement in motor function over 15 months: 57% of patients achieved clinically-meaningful improvement in Hammersmith Functional Motor Scale Expanded (HFMSE) scores at 15 months (assesses motor skills including lifting of arms, sitting, standing and walking; p<0.001).[ii,x]

  An additional subset analysis from CS2/12 unveiled at 2018 American Academy of Neurology (AAN) Annual Meeting showed that later-onset SMA patients treated with SPINRAZA walked longer distances while experiencing stable or less fatigue over time, in contrast to SMA natural history. Among ambulatory participants (n=14) ages 2 to 15 years with SMA Type 2 (n=1) or Type 3 (n=13) at study enrolment, their walking distance increased (a median increase of 98 meters) while simultaneously, their fatigue level remained stable or decreased (a median decrease of 3.8 percent) over nearly 3 years.[xi]

- **Pre-symptomatic SMA** – SPINRAZA helps achieve milestones unexpected in Type 1 or 2 SMA and more consistent with normal development: Improvements in HINE motor milestones were achieved in 16 patients (89%). Out of 18 patients that received SPINRAZA before the onset of SMA symptoms, 12 were able to sit independently, 9 were able to stand with or without support and 6 were able to walk with or without support.[ii]

SPINRAZA is the first approved medicine for the treatment of SMA and is currently approved for use in the United States, the European Union, Canada, Australia, Japan, Switzerland, Brazil, South Korea, Chile, Uruguay and New Zealand. Biogen has submitted regulatory filings in additional countries and plans to initiate additional filings in other countries.

**About SMA**[iv,v,vi,vii,viii]

Spinal muscular atrophy (SMA) is characterized by loss of motor neurons in the spinal cord and lower brain stem, resulting in severe and progressive muscular atrophy and weakness. Ultimately, individuals with the most severe type of SMA can become paralyzed and have difficulty performing the basic functions of life, like breathing and swallowing.

Due to a loss of, or defect in, the SMN1 gene, people with SMA do not produce enough SMN protein, which is critical for the maintenance of motor neurons. The severity of SMA correlates with the amount of SMN protein. People with Type 1 SMA, the form that requires the most intensive and supportive care, produce very little SMN protein and do not achieve the ability to sit without support or live beyond two years without respiratory support. People with Type 2 and Type 3 SMA produce greater amounts of SMN protein and have less severe, but still life-altering forms of SMA.

## About SPINRAZA® (nusinersen)

SPINRAZA is being developed globally for the treatment of SMA.

SPINRAZA is an antisense oligonucleotide (ASO), using Ionis Pharmaceuticals' proprietary antisense technology, that is designed to treat SMA caused by mutations or deletions in the SMN1 gene located in chromosome 5q that leads to SMN protein deficiency. SPINRAZA alters the splicing of SMN2 pre-mRNA in order to increase production of full-length SMN protein.[ix] ASOs are short synthetic strings of nucleotides designed to selectively bind to target RNA and regulate gene expression. Through use of this technology, SPINRAZA has the potential to increase the amount of full-length SMN protein in individuals with SMA.

## About Biogen

At Biogen, our mission is clear: we are pioneers in neuroscience. Biogen discovers, develops and delivers worldwide innovative therapies for people living with serious neurological and neurodegenerative diseases. Founded in 1978 as one of the world's first global biotechnology companies by Charles Weissman and Nobel Prize winners Walter Gilbert and Phillip Sharp, today Biogen has the leading portfolio of medicines to treat multiple sclerosis; has introduced the first and only approved treatment for spinal muscular atrophy; and is focused on advancing neuroscience research programs in Alzheimer's disease and dementia, neuroimmunology, movement disorders, neuromuscular disorders, pain, ophthalmology, neuropsychiatry and acute neurology.

For more information please visit: www.biogen.com

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