**Acronyms and abbreviations:**

F - frequency

FVC – Forced vital capacity

HFMSE - Hammersmith Function Motor Scale Expanded scale

lvl – level of the spinal cord

N-S – Non-sitters

Nus - Nusinersen

OA – Onasemnogene abeparvovec

Risd - Risdiplam

ROM – Range of Movements of joints with contracture

RULM - Revised Upper Limb Module scale

S – Sitters

Treatm - Treatment duration

tSCS - transcutaneous Spinal Cord Stimulation

W – Walkers

**Table S1. Demographics and clinical parameters of SMA type 2 participants**

Adult participant is marked in gray

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Participants** | **Sex** | **Age,****years** | **Orphan drug** | **RULM,****score** | **HFMSE,****score** | **FVC,****%** | **Knee ROM,****deg** | **Functional****status** |
| **Nus** | **Risd** | **OA** | **Treatment,****months** | **Right** | **Left** | **N-S** | **S** | **W** |
| 21K53 | M | 3 | Y |   |   | 21 | 37 | 37 |  |   |   |   | Y |   |
| 6K12 | M | 3 | Y |   |   | 24 | 16 |   |  |   |   | Y |   |   |
| 8K18 | M | 5 | Y |   |   | --1 | 21 | 30 |  |   |   |  | Y  |   |
| 15K49 | M | 5 |   |   | Y | 30 | 16 |   |  | 178 | 168 | Y |   |   |
| 1K1 | M | 6 | Y |   |   | -- | 35 |   |  |   |   |  |  Y |   |
| 10K30 | F | 6 | Y |   |   | 31 | 24 |   | 74 | 145 | 128 | Y |   |   |
| 5K10 | M | 6 |   | Y |   | 26 | 15 |   | 66 |   |   | Y |   |   |
| 1K2 | F | 7 |   | Y |   | 8 | 17 | 4 | 47 |   |   | Y |  |   |
| 15K47 | M | 7 | Y |   |   | 26 | 16 |   | 38 | 150 | 160 | Y |   |   |
| 9K22 | F | 8 | Y |   |   | 34 | 35 | 49 | 113 |   |   |   | Y |   |
| 16K50 | M | 8 | Y |   |   | 27 | 26 | 24 | 68 | 170 | 169 |  | Y  |   |
| 3K5 | F | 9 |   | Y |   | 17 | 24 | 17 | 66 | 122 | 130 |   | Y |   |
| 6K11 | F | 9 | Y |   |   | 13 | 6 |   | 9 | 118 | 124 | Y |   |   |
| 9K23 | M | 12 | Y |   |   | 19 | 22 | 11 | 94 | 125 | 127 | Y |   |   |
| 5K8 | M | 12 |   | Y |   | 5 | 28 |   | 58 | 139 | 146 |  | Y |   |
| 8K20 | F | 13 |   | Y |   | 34 | 30 |   | 71 |   |   | Y |  |   |
| 9K24 | F | 13 | Y |   |   | 21 | 18 |   | 22 |   |   | Y |   |   |
| 7K14 | F | 15 | Y |   |   | 16 | 0 |   | 42 | 169 | 153 | Y |   |   |
| 8K19 | M | 16 |   | Y |   | 31 | 5 |   | 11 | 125 | 109 | Y |   |   |
| 14K44 | F | 39 | Y |   |   | 36 | 13 |   |  | 165 | 170 |   | Y |   |

1 Medical records of initial treatment not provided

**Table S2. Demographics and clinical parameters of SMA type 3 participants**

Adult participants are marked in gray

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Participants** | **Sex** | **Age,****years** | **Orphan drug** | **RULM,****score** | **HFMSE,****score** | **FVC,****%** | **Knee ROM,****deg** | **Functional****status** |
| **Nus** | **Risd** | **OA** | **Treatment,****months** | **Right** | **Left** | **N-S** | **S** | **W** |
| 11K34 | M | 7 | Y |   |   | 57 | 37 | 49 | 38 |   |   |   |   | Y |
| 20K51 | M | 8 | Y |   |   | 47 | 37 | 37 | 106 |   |   |   | Y |   |
| 12K43 | M | 9 | Y |   |   | 36 | 37 | 16 | 72 | 116 | 112 |   | Y |   |
| 9K26 | M | 10 | Y |   |   | 22 | 35 | 40 | 97 | 150 |  |   | Y |   |
| 12K42 | F | 10 | Y |   |   | 38 | 36 | 35 | 105 | 165 |  |   | Y |   |
| 7K15 | F | 11 | Y |   |   | --1 | 26 | 18 | 79 | 156 | 172 |  | Y  |   |
| 11K39 | F | 11 | Y |   |   | 23 | 20 |   | 42 |  |  | Y |   |   |
| 9K27 | M | 12 | Y |   |   | 32 | 37 | 51 | 71 | 167 | 178 |   | Y |   |
| 2K3 | M | 12 | Y |   |   | 22 | 37 | 59 | 111 |   |   |   | Y |   |
| 11K35 | M | 13 | Y |   |   | 20 | 37 | 51 | 122 | 174 | 165 |   | Y |   |
| 15K48 | F | 14 | Y |   |   | 35 | 31 | 57 | 103 |   |   |   |   | Y |
| 9K28 | M | 20 | Y |   |   | 20 | 23 | 28 | 78 |   |   |  | Y  |   |
| 10K32 | F | 24 | Y |   |   | 16 | 34 | 40 | 61 | 171 | 154 |   | Y |   |
| 4K7 | M | 24 | Y |   |   | 22 | 29 | 40 | 95 | 167 | 166 |   | Y |   |
| 9K25 | F | 27 | Y |   |   | 13 |  37 | 41 | 74 |   |   |   | Y |   |
| 11K37 | F | 36 | Y |   |   | 21 | 32 | 50 | 56 |   |   |   | Y |   |
| 8K21 | M | 42 | Y |   |   | -- | 14 | 27 | 81 |  |   |   | Y |   |

1 Medical records of initial treatment not provided

**Table S3. Spinal stimulation parameters of SMA type 2 participants**

Adult participant is marked in gray

| **Participants** | **Cervical lvl** | **Thoracolumbar lvl** | **Sacral lvl** | **tSCS****duration2,****min** | **Therapy****duration,****days** |
| --- | --- | --- | --- | --- | --- |
| **Current1,****mA** | **F,****Hz** | **Current1,****mA** | **F,****Hz** | **Current1,****mA** | **F,****Hz** |
| 21K53 | 10 | 20 | 10 | 20 |  |  | 20 | 12 |
| 6K12 | 22 | 30 | 22 | 30 | 22 | 30 | 30 | 12 |
| 8K18 | 18 | 30 |  |  |  |  | 40 | 12 |
| 15K49 | 12 | 30 | 12 | 30 |  |  | 40 | 12 |
| 1K1 |  |  | 30 | 20 | 30 | 20 | 20 | 12 |
| 10K30 |  |  | 18 | 30 | 18 | 35 | 35 | 12 |
| 5K10 | 20 | 30 | 20 | 30 |  |  | 20 | 10 |
| 1K2 | 7 | 30 | 7 | 30 |  |  | 45 | 12 |
| 15K47 | 45 | 30 |  |  | 39 | 30 | 40 | 10 |
| 9K22 | 25 | 30 |  |  |  |  | 20 | 12 |
| 16K50 | 30 | 30 | 30 | 30 |  |  | 20 | 12 |
| 3K5 | 10 | 30 |  |  |  |  | 20 | 12 |
| 6K11 | 45 | 30 | 27 | 30 |  |  | 10 | 12 |
| 9K23 | 20 | 30 |  |  |  |  | 20 | 12 |
| 5K8 | 30 | 30 | 30 | 30 |  |  | 50 | 10 |
| 8K20 | 25 | 30 | 25 | 30 |  |  | 35 | 12 |
| 9K24 | 12 | 30 |  |  |  |  | 20 | 10 |
| 7K14 | 30 | 30 | 30 | 30 |  |  | 15 | 12 |
| 8K19 | 30 | 30 | 30 | 30 |  |  | 50 | 12 |
| 14K44 | 12 | 20 | 12 | 20 |  |  | 15 | 12 |

**1** maximal current intensity during tSCS course; **2** estimated duration per day excluding breaks to relax participants and change positions for the next therapeutic exercise.

**Table S4. Spinal stimulation parameters of SMA type 3 participants**

Adult participants are marked in gray

| **Participants** | **Cervical lvl** | **Thoracolumbar lvl** | **Sacral lvl** | **tSCS****duration2,****min** | **Therapy****duration,****days** |
| --- | --- | --- | --- | --- | --- |
| **Current1,****mA** | **F,****Hz** | **Current1,****mA** | **F,****Hz** | **Current1,****mA** | **F,****Hz** |
| 11K34 | 15 | 30 | 15 | 30 |  |  | 30 | 12 |
| 20K51 | 20 | 20 | 20 | 20 |  |  | 50 | 12 |
| 12K43 | 23 | 30 | 18 | 30 |  |  | 50 | 10 |
| 9K26 | 32 | 30 | 42 | 30 |  |  | 30 | 12 |
| 12K42 | 65 | 30 |  |  | 65 | 30 | 35 | 12 |
| 7K15 | 60 | 30 |  |  |  |  | 20 | 12 |
| 11K36 | 30 | 30 | 30 | 30 |  |  | 45 | 8 |
| 9K27 | 40 | 30 | 40 | 30 |  |  | 30 | 12 |
| 2K3 | 30 | 30 |  |  |  |  | 30 | 12 |
| 11K35 | 40 | 30 | 40 | 30 |  |  | 20 | 12 |
| 15K48 | 15 | 30 | 49 | 30 |  |  | 40 | 12 |
| 9K28 | 15 | 30 | 20 | 30 |  |  | 30 | 12 |
| 10K32 |  |  | 55 | 30 |  |  | 35 | 13 |
| 4K7 | 45 | 30 | 27 | 30 | 20 | 20 | 40 | 12 |
| 9K25 | 20 | 30 | 20 | 30 |  |  | 30 | 12 |
| 11K37 | 15 | 30 | 25 | 30 |  |  | 20 | 12 |
| 8K21 | 30 | 30 | 30 | 30 |  |  | 50 | 10 |

lvl – level; **1** maximal current intensity during tSCS course; **2** estimated duration per day excluding breaks to relax participants and change positions for the next therapeutic exercise.

|  |  |
| --- | --- |
|  |  |
| (**a**) | (**b**) |
|  |  |
|  |
| (**c**) | (**d**) |

Figure S1. Frequency distribution of the difference in RULM (**a**), HFMSE (**b**), FVC (**c**), and ROM (**d**) before and after tSCS sessions in SMA type 2 and type 3 groups. Bin is 1 point in (**a**) and (**b**) and 5 percent and degrees in (**c**) and (**d**), respectively.

**Table S5. New motor skills of participants with SMA type 2 after the tSCS training course**

Adult participant is marked in gray

|  |  |
| --- | --- |
| **Participants** | **New motor skills** |
|
| 21K53 | Standing unsupported up to 1 minute |
| 6K12 | Head elevation in prone position. Head elevation from pillow in supine position |
| 8K18 |  |
| 15K49 | When eating, uses a spoon |
| 1K1 |  |
| 10K30 | Moving from supine to sitting with hands |
| 5K10 |  |
| 1K2 | Supine, legs vertical, up to 15 seconds |
| 15K47 |  |
| 9K22 | Standing unsupported up to 2,5 minutes |
| 16K50 | Moves from wheelchair to couch without support |
| 3K5 | Sitting on the floor, moves forward 2-3 meters using hands and legs |
| 6K11 |  |
| 9K23 |  |
| 5K8 | Moves from the floor to wheelchair without support |
| 8K20 |  |
| 9K24 |  |
| 7K14 | Rolling from the supine to the lateral position |
| 8K19 | Raises and holds knees in supine position |
| 14K44 |  |

**Table S6. New motor skills of participants with SMA type 3 after the tSCS training course**

Adult participants are marked in gray

|  |  |
| --- | --- |
| **Participants** | **New motor skills** |
|
| 11K34 | Use one hand (instead of two) to walk up and down stairs |
| 20K51 |  |
| 12K43 |  |
| 9K26 | Moves from all fours to wheelchair without support |
| 12K42 | Standing unsupported and walking 2-3 meters supported |
| 7K15 | Standing on all fours up to half a minute |
| 11K39 | Movement from supine to right side position |
| 9K27 | Pick up and move 100-gram weight |
| 2K3 |  |
| 11K35 | Ability to extend from standing with hands on knees to standing upright |
| 15K48 |  |
| 9K28 | Movements from supine to prone position and from prone position to supine position |
| 10K32 |  |
| 4K7 | Transition from sitting on the floor to kneeling on the floor, kneeling on both knees |
| 9K25 |  |
| 11K37 |  |
| 8K21 | The ability to wash the face with the right hand without supporting the forearm with the left hand has returned |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| (**a**) | (**b**) | (**c**) |
|  |  |  |
| (**d**) | (**e**) | (**f**) |

**Figure S2.** Difference in RULM, HFMSE and FVC before and after tSCS sessions versus age. (**a**) - (**c**) - SMA type 2 group; (**d**) - (**f**) - SMA type 3 group.