The impact of olipudase alfa on adults with ASMD

Solomon Mbua, INPDR

Justin Hopkin, NNPDF

Toni Mathieson, NPUK

Joslyn Crowe, NNPDF

Conan Donnelly, INPDR

SUMMARY OF FINDINGS

The International Niemann-Pick Disease Registry (INPDR), in partnership with International Niemann-Pick Disease Alliance (INPDA), National Niemann-Pick Disease Foundation (NNPDF) and Niemann-Pick UK (NPUK) conducted an international survey with the aim of collecting additional evidence from the patient perspective on the impact of olipudase alfa therapy on adults with acid sphingomyelinase deficiency (ASMD). This study was undertaken to supplement clinical trial results and inform access and reimbursement decisions. Results are based on adult patients with ASMD from five different countries.

Adult patients (>18 years) with ASMD and who had received olipudase alfa for more than one year were invited to participate in an online survey with survey participants invited to also take part in a semi-structured interview.

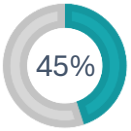
Online survey

11 patients. Median age 42 years

Interviews

7 patients. Median age 42 years

First symptoms (n=11)



appeared between 2 months and less than 2 years of age

Median age of confirmed diagnosis

4 years of age

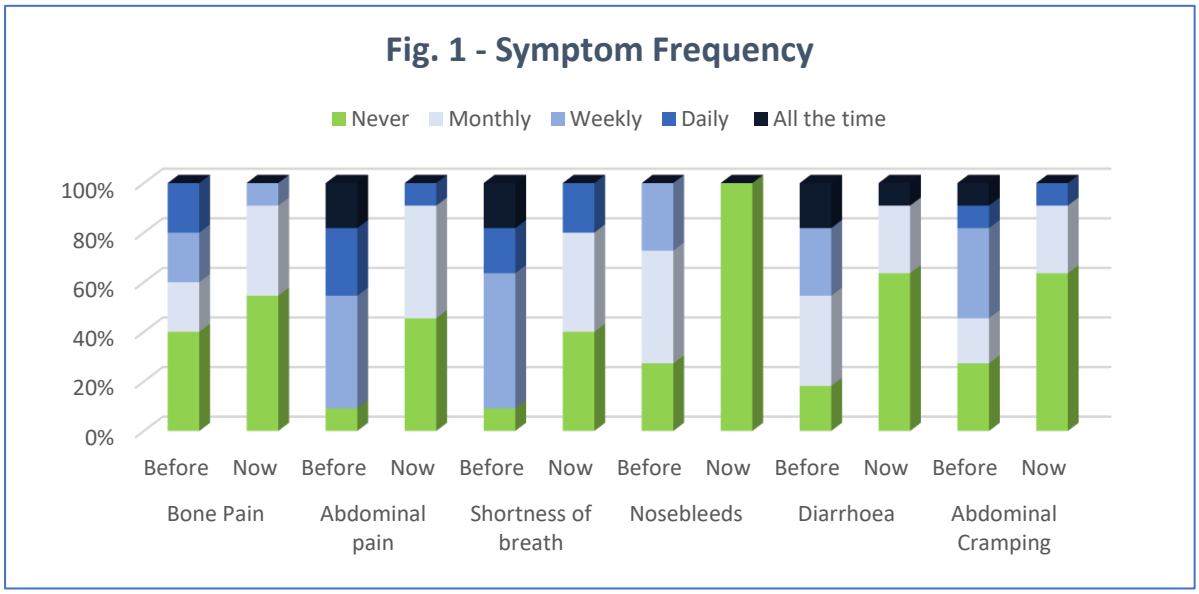
(mean 13.5, range 2–36)

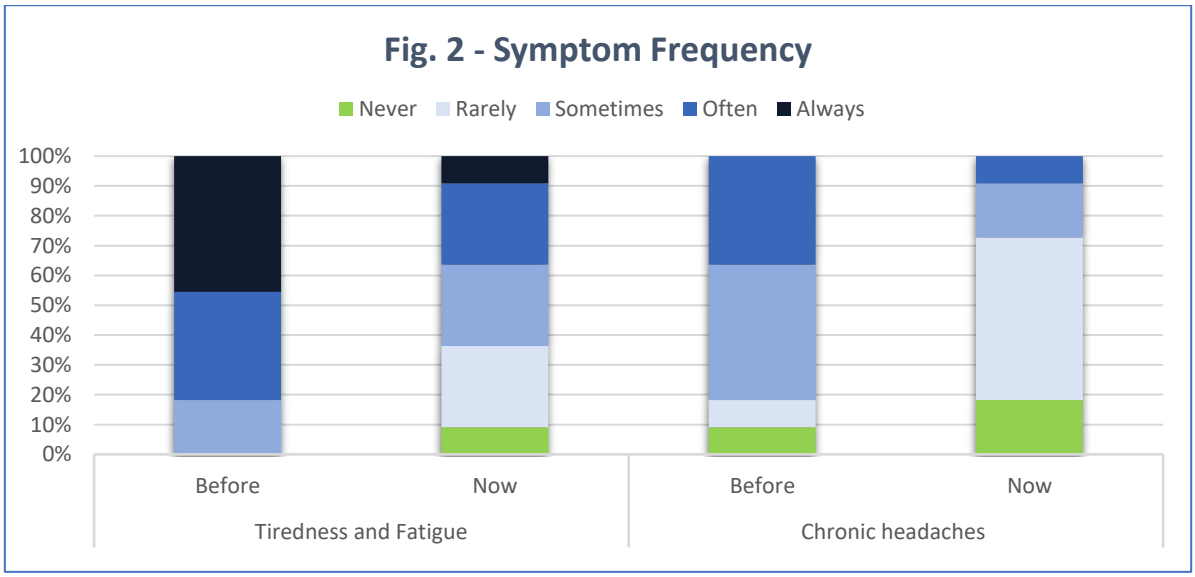
Treatment with olipudase alfa started at a median age of

36 years

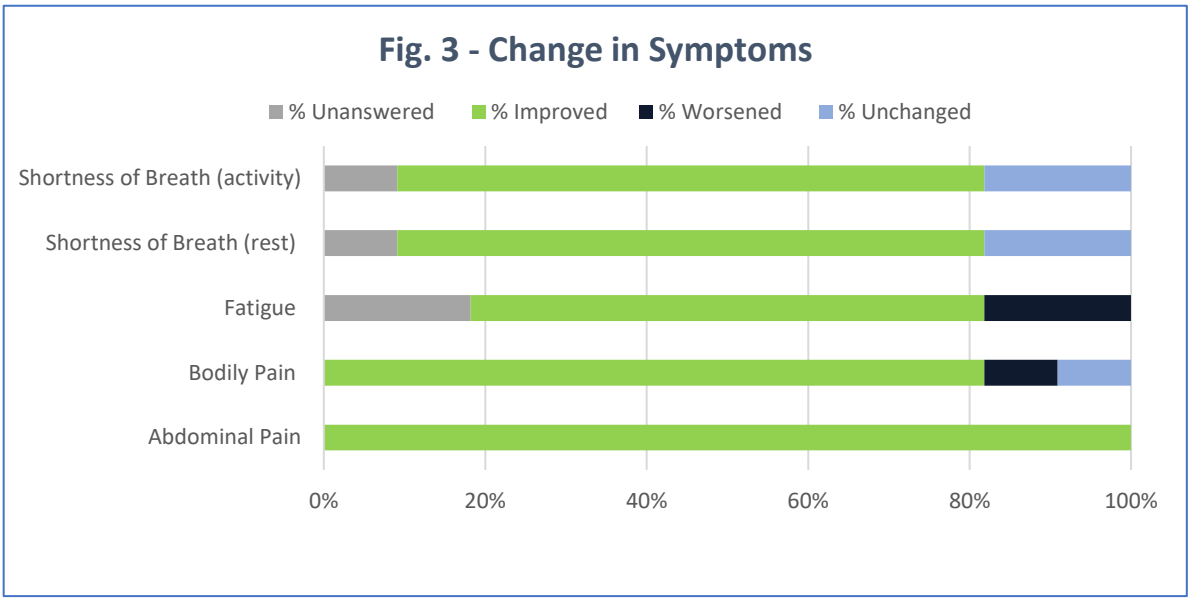
(mean 38.1, range 20–55)

- Patients receiving on olipudase alfa (n=11) were asked how frequently symptoms were experienced before treatment, and how frequently are symptoms being experienced now. (Fig. 1 and Fig. 2).
- All patients reported at least one symptom of ASMD before treatment with abdominal pain, tiredness & fatigue, chronic headaches, shortness of breath and diarrhoea most frequently reported.
- For most patients, these symptoms were a frequent experience in their life. Almost half of patients reported tiredness and fatigue all the time and almost 40% reported shortness of breath every day while almost 80% reported abdominal pain at least weekly.
- All patients reported improvements in some symptoms after treatment. For every symptom surveyed, the number of patients experiencing the symptom reduced after treatment and the reported frequency also improved.



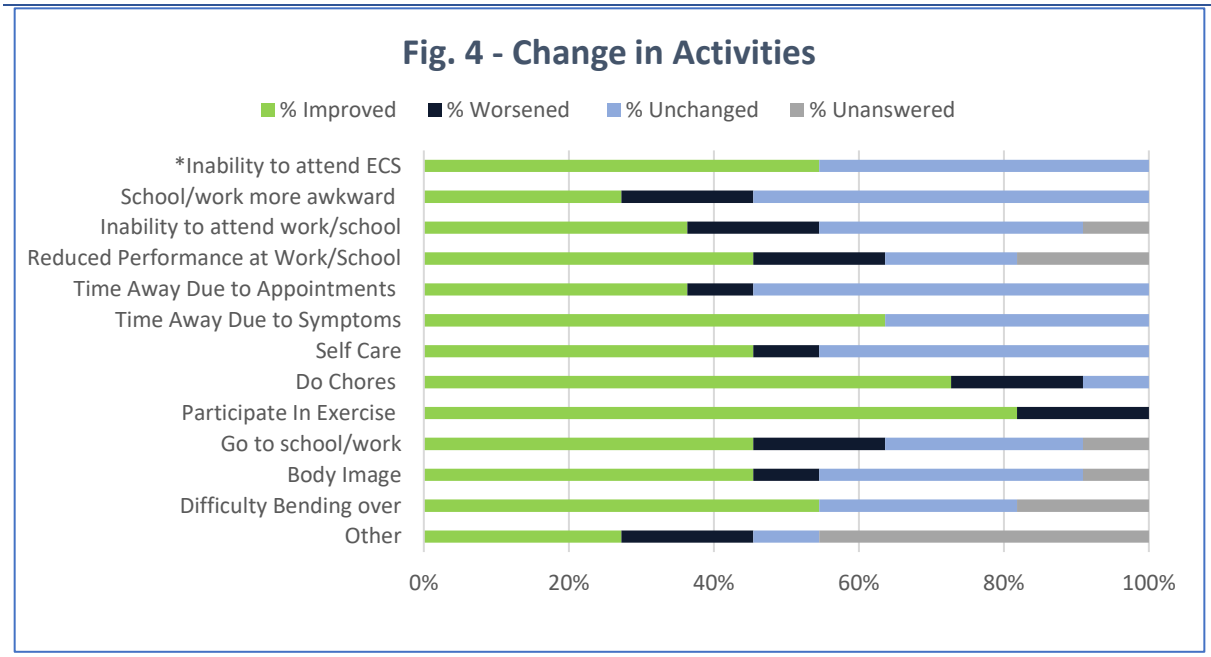


- Patients were also asked specifically about change in symptoms and activities since starting treatment with olipudase alfa.
- All patients reported improvement in at least one symptom since starting treatment with olipudase alfa, with all patients reporting improvement in abdominal pain and approximately 80% reporting improvements in shortness of breath, bodily pain and fatigue.
- Few respondents reported worsening symptoms in fatigue and bodily pain (Fig. 3).



The impact of ASMD on activities of daily life

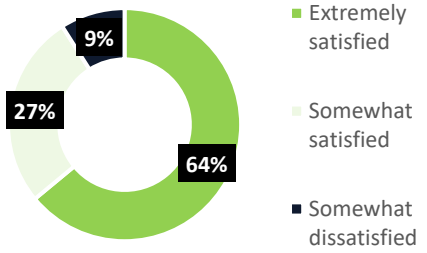
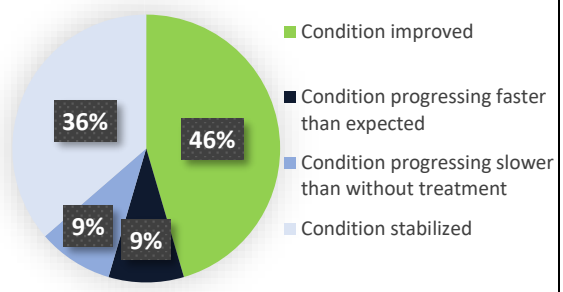
- Participants were also asked about the impact of ASMD on the activities of day-to-day life and how this changed with treatment.
- Almost 50% of patients reported improvement in their ability to perform activities since starting treatment with olipudase alfa, with the majority of respondents reporting significant improvement in symptoms such as ability to participate in exercise (82%), ability to do chores (73%), time away due to symptoms.
- In contrast, most respondents reported an “unchanged” status in issues such as school/work more awkward (55%) and time away due to appointments (55%).
- Few respondents reported worsening of ability to perform activities such as their ability to participate in exercise, ability to do chores, as well as a reduced performance at work/school (Fig. 4).
- The impact of ASMD on evaluated symptoms in the survey improved after olipudase alfa therapy.



*ECS=Extra Curricular Activities

Since starting treatment with olipudase alfa,

- Over 50% of respondents reported **improvement** in ability to attend or participate in extracurricular activities, to do chores, to participate in exercise and less difficulty bending over.
- Over 45% of respondents reported an improvement in their attendance at school related to uncontrolled symptoms.
- Over 40% of respondents reported **improvement** in their performance at work/school, ability to do selfcare, and their body image.
- Over 30% of respondents reported **improvement** in ability to attend work/school and time away due to appointments while over 60% reported a worsening of their ability to attend school/work due to appointments.

Satisfaction with olipidase alfa	Global impression of disease burden since starting olipudase alfa
	
91% of respondents reported they were extremely satisfied or somewhat satisfied with olipudase alfa while 9% reporting they were somewhat dissatisfied. Many reported fewer symptoms or signs of ASMD after treatment, and they can now lead a better life. Reported dissatisfaction was related, in part, to the management of treatment.	**100%** of respondents described a positive impact on ASMD disease burden associated with olipudase. Five reported the burden improved, 4 reported it stabilised, and 1 reported the disease progressed slower than expected without treatment while receiving treatment with olipudase alfa.
Concerns about treatment	**Views on current and new treatment options available for ASMD**
Some respondents reported disadvantages /adverse effects of olipudase alfa which include: • Cost of treatment and dealing with insurance. • One respondent reported inflammatory side-effects. • Inconvenience of infusion in hospital. • Impact on daily life such as ability to attend work due to side effects (unspecified) from treatment. • One respondent reported that regular treatment and insurance battles makes it more apparent to them that they are sick.	Respondents explained that although olipudase alfa had been effective in improving symptoms of ASMD, new therapies may be preferred to either cure or further reduce symptoms of ASMD. An alternative treatment with a less invasive form/route of administration was mentioned as a preference.

BACKGROUND

Acid sphingomyelinase deficiency (ASMD) is a rare autosomal recessive lysosomal storage disorder caused by mutations in the *SMPD1* gene, which codes for ASM.[1] Deficient ASM activity results in the accumulation of sphingomyelin and other lipids in cells and tissues.[2] ASMD is classified as Niemann-Pick disease type A (acute neurovisceral) and Niemann-Pick disease type B (chronic visceral) or A/B (chronic neurovisceral).[2,3] Type A is characterised by severe progressive neurodegeneration in their first year followed by early death.[2,4] Types B and A/B have a broad spectrum of disease severity, with type B associated with minimal to no central nervous system involvement, and A/B presenting with some neurological involvement but not as severe as type A.[3] Symptoms of types B and A/B usually start in childhood.[2,4]

Olipudase alfa is an enzyme replacement therapy (ERT) approved to treat ASMD. It does not cross the blood brain barrier, therefore is unlikely to impact central nervous system (CNS) symptoms.[3] Early trials have included patients with ASMD Types B and A/B.

The International Niemann-Pick Disease Alliance (INPDA), International Niemann-Pick Disease Registry (INPDR), National Niemann-Pick Disease Foundation (NNPDF), and Niemann-Pick UK (NPUK) wished to collect additional evidence, from the patient and caregiver perspective, on the impact of olipudase alfa therapy on patients with ASMD.

INPDR conducted an international study that included an online survey and interview. Rare Disease Research Partners (RDRP) were contracted to undertake semi-structured interviews with patients or their caregivers. In this report, we summarise the responses of patients with ASMD and their caregivers.

STUDY AIMS

The study aims were to:

- increase the understanding of the impacts of ASMD on adult patients
- explore the effects of olipudase alfa on adult patients
- gain insights from patients into the unmet need for treatment of ASMD

METHODS

The study consisted of an international online survey in English followed by semi-structured interviews.

The survey was open to adults aged 18 years and over (or their parent/caregiver) who:

- were fluent in English (including non-native English speakers) **and**
- were able to give informed consent **and**
- had a confirmed diagnosis of ASMD **and**
- had received olipudase alfa as an experimental or approved therapy for ASMD

The semi-structured interviews were available to respondents who had consented to be contacted by RDRP about the interviews and had completed the online survey. Those who wished to participate in an interview were required to complete an additional consent form prior to the interview.

Recruitment

Recruitment to participate in the on-line survey was conducted through NNPDF & NPUK. Communications were sent to their membership via email.

Participants who also wished to take part in an interview (as indicated on the on-line survey) were identified by NNPDF and RDRP made direct contact with the participant.

Consent

A Participation Information Sheet and Informed Consent were displayed at the start of the on-line survey. Only those that provided consent were able to proceed with the survey. Separate consents were obtained for the interviews via the online survey and through RDRP.

Survey

The online survey was designed with input from INPDA, INPDR, NNPDF and NPUK to cover demographics, first symptoms, treatment with olipudase alfa, symptoms before and after treatment, overall change in symptoms & activities since treatment, current treatment for ASMD, experience with olipudase alfa and satisfaction with olipudase alfa. The survey included multiple choice, matrix and open text questions to provide both quantitative and qualitative data.

The survey was hosted on the on-line Qualtrics^{XM} platform and distributed via a link. The survey was open from 07th February to 12th May 2023.

Interviews

A semi-structured interview guide was developed that covered questions from the survey in more depth and to further understand the impacts of olipudase alfa on patients and their families.

Interviews were conducted via Zoom by Rare Disease Research Partners. 5 interview participants were contacted between 20th Apr 2023 and 24th May 2023 and were audio recorded and transcribed for analysis.

Analysis

A qualitative and quantitative analysis of the survey results was undertaken. Interview transcripts were analysed using an inductive thematic approach using NVivo software.

RESULTS

Respondents

Twenty-one respondents attempted the survey between 07 February–12 May 2023. The following were exclusions to the final dataset: seven respondents did not continue with the survey, one respondent was a paediatric patient, and two duplicates were excluded. Responses included a total of eleven adult patients who are included in this analysis (Figure 1).

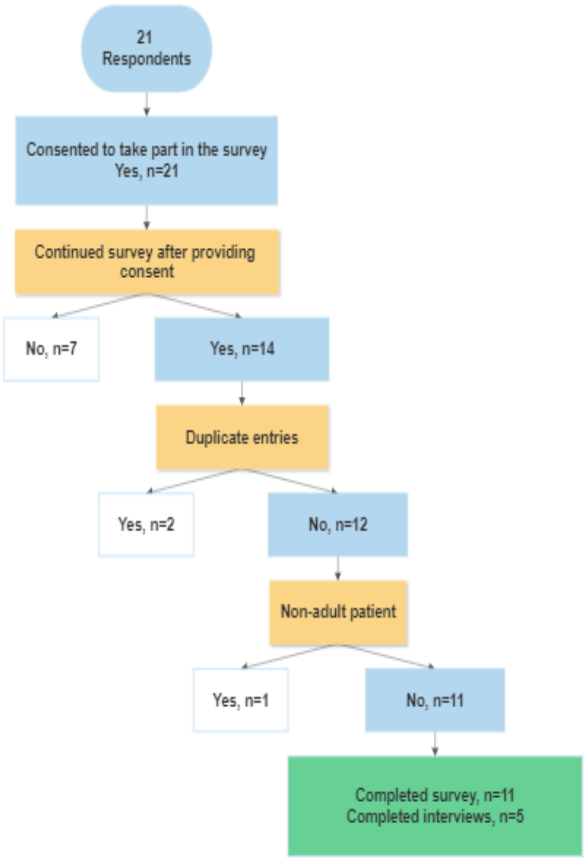


Figure 1. Survey respondents, exclusions and inclusions

All respondents included in this report were adult patient with ASMD with the exception of one caregiver of an ASMD patient. Interviews were undertaken for five adult patients (Figure 1). Interviews with parents of two further patients over 18 years who were interviewed during the corresponding paediatric survey were included in these study results.

Survey respondents were born and resided in five different countries: Canada, Spain, South Africa, USA and the UK (Figure 2). Only USA and Canadian participants took part in the interviews.

Figure 2. Country residence of participants in the survey and interviews.

Patient demographics

Survey
11
patients

Median age of the 11 patients with ASMD at the time of the survey was 42 years (mean 9.8, range 20–57).

73% (n=8)

Median age of females: 40.5 years (mean 44.5, range 33–57)

27% (n=3)

Median age of males: 43 years (mean 36.3, range 20–46)

The 11 patients included in the survey were born between 1965 and 2002, with 54% (6/10) being born between 1980–1989 (Figure 3).

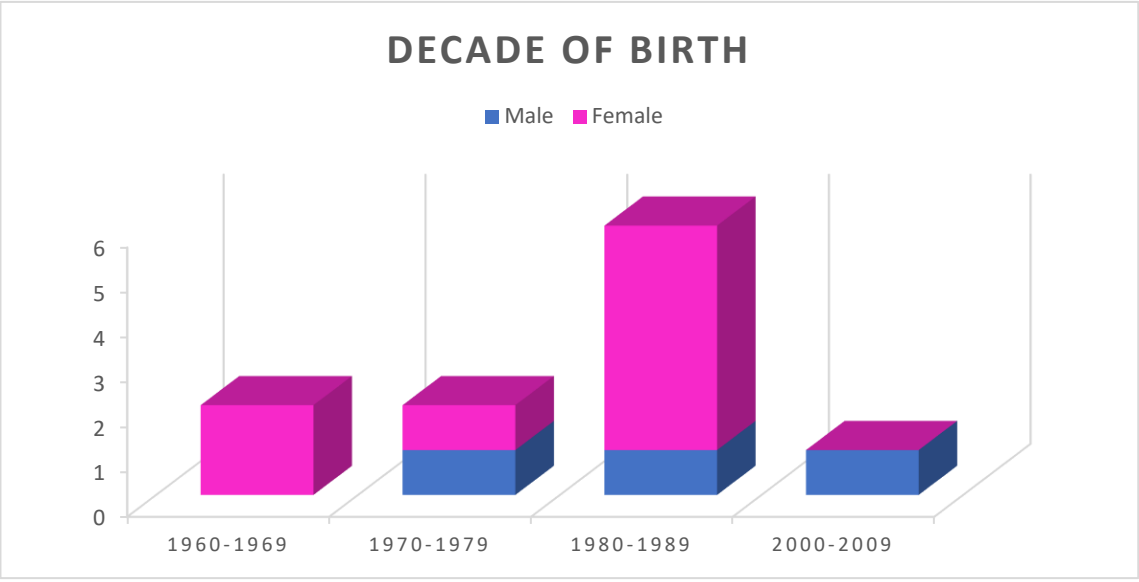


Figure 3. Distribution of survey participants by decade of birth (n=11)

Interviews
7
patients

Median age of the 7 patients who participated in the interviews was 42 years (mean 42.7, range 26–58)

First symptoms

Respondents were asked when the first symptoms of ASMD appeared. First symptoms of ASMD were reported to appear between 2 months and 2 years of age for 46% percent of patients (5/11) (Figure 4). 82% of patients in the study had experienced first symptoms of ASMD before 18 years of age.

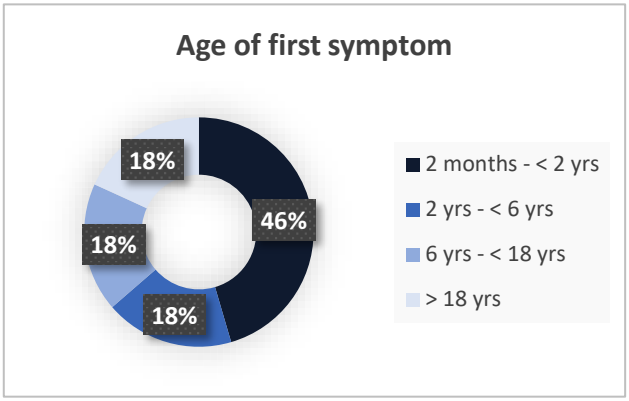


Figure 4. Age of first symptoms of ASMD (n=10)

Diagnosis

None of the 11 patients had their diagnosis of ASMD made before or at the time of birth. The median age at which diagnosis was confirmed was 7.5 years of age (mean 14.65, range 2–36). Diagnosis of ASMD (n=8) was made by enzyme testing (n=1), DNA sequencing (n=1), both enzyme and DNA sequencing (n=2), or tissue biopsy (n=4) (Figure 5). 3 respondents did not report how their diagnosis was made.

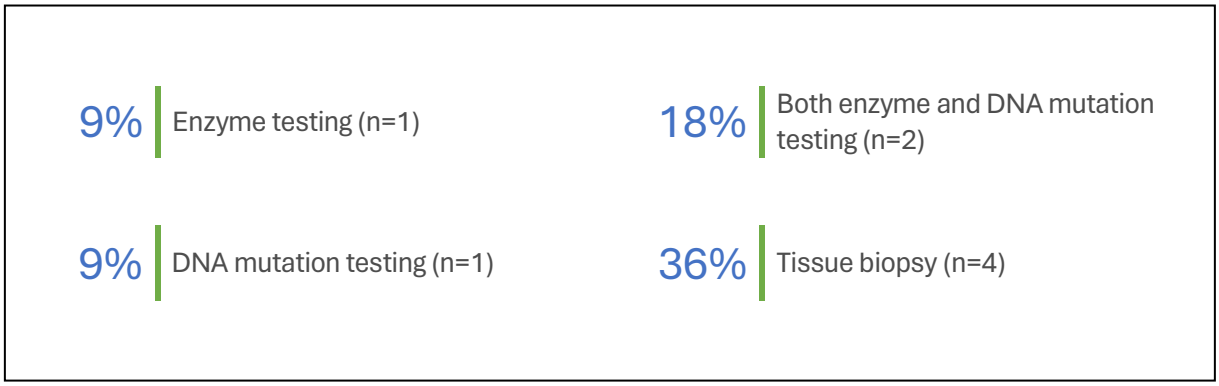
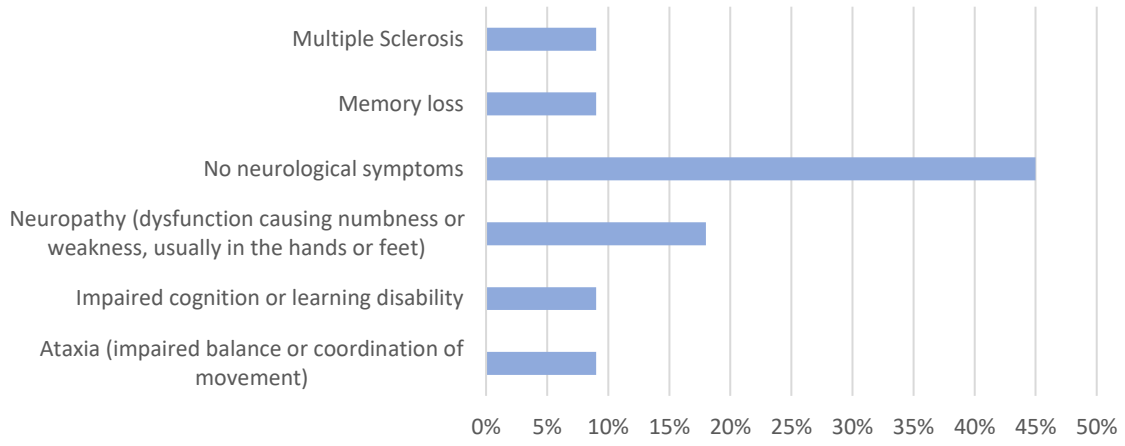


Figure 5. How ASMD diagnosis was made (n=8)

Respondents were asked if they had experienced one or more neurological symptoms of ASMD. 55% of respondents (5/11) had not experienced neurological symptoms, 18% (2/11) had experienced neuropathy (nerve damage causing numbness or weakness, usually in the hands or feet). Other reported symptoms included (all n=1) ataxia (impaired balance or co-ordination of movement), impaired cognition or learning disability, memory loss and multiple sclerosis. (Figure 6).

Figure 6: Percentage of patients (n=11) who experienced a neurological symptom



Treatment

Respondents initiated olipudase alfa at a median age of 36 years (mean 38, range 20-55 n=11).

All patients were still on treatment at the time of the survey and had been on treatment for a median of 1.7 years (mean 4.1, range 0.5–9.9 n=11).

How often were symptoms experienced before and since starting treatment with olipudase alfa?

Respondents were asked to rate how often various ASMD symptoms had been experienced by the patient before treatment with olipudase alfa and now, after haven been on treatment.

Bone pain

Before starting treatment with olipudase alfa, 60% of respondents experienced bone pain with 40% experiencing the symptom daily or weekly. After treatment the proportion experiencing the symptom reduced to 45% with symptom frequency also reducing markedly (Figure 7a).

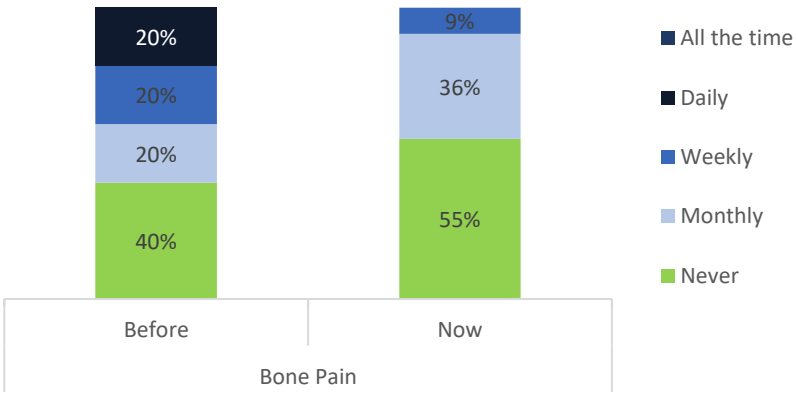


Figure 7a. Percentage of patients who experienced bone pain before (n=10) and after (n=11) treatment with olipudase alfa.

Abdominal pain

Before treatment with olipudase alfa, 91% of respondents experienced abdominal pain with 45% reporting symptom frequency either daily or all the time. After commencing treatment, abdominal pain symptoms reduced to 55% with 45% only reporting to experience the symptom monthly (Figure 7b).

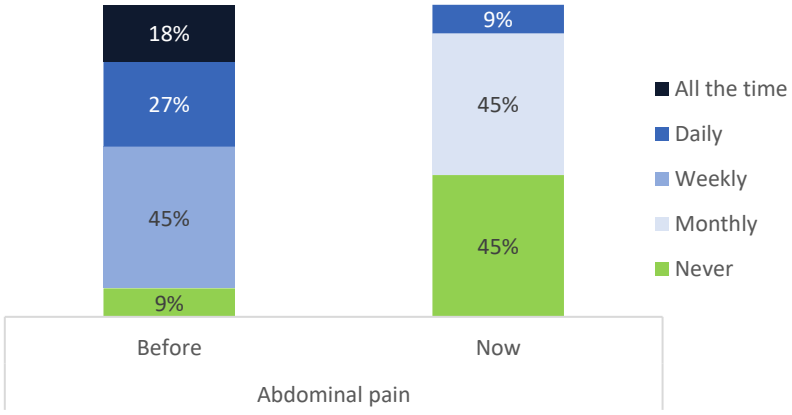


Figure 7b. Percentage of patients (n=11) who experienced abdominal pain before and after treatment with olipudase alfa.

Shortness of breath

Before treatment with olipudase alfa, 91% of respondents reported shortness of breath at least weekly and 18% reported this symptom as occurring all the time. After treatment, 60% of respondents reported shortness of breath and only 20% reported these symptoms weekly and no one reported it daily or all the time. (Figure 7c).

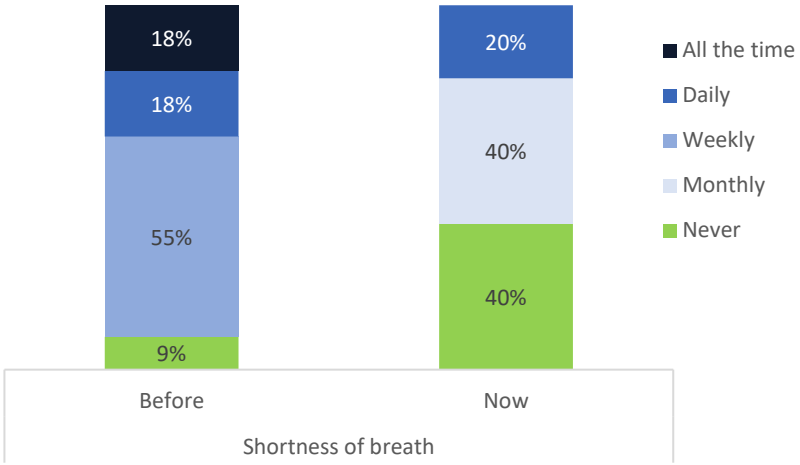


Figure 7c. Percentage of patients who experienced shortness of breath before (n=11) and after (n=10) treatment with olipudase alfa.

Nosebleeds

Before starting treatment with olipudase alfa, 73% of respondents reported having nosebleeds at least monthly. After starting treatment with olipudase alfa, no patients reported a nosebleed (Figure 7d).

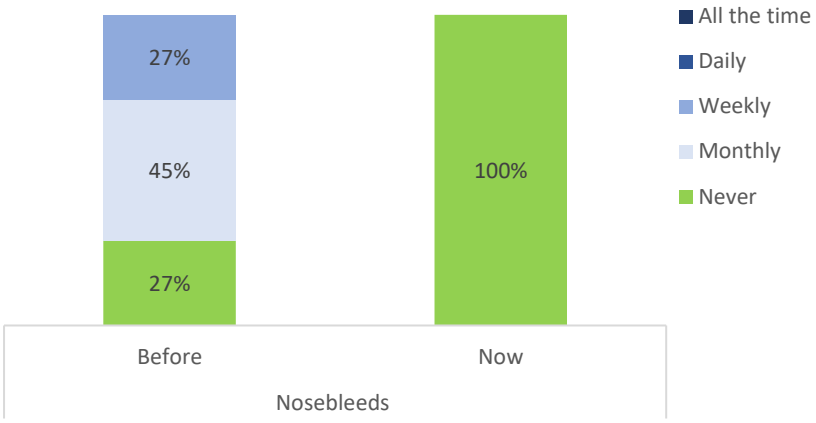


Figure 7d. Percentage of patients (n=11) who experienced nosebleeds before and after treatment with olipudase alfa.

Diarrhoea

Before starting treatment with olipudase alfa, 82% of respondents reported experiencing diarrhoea and 45% reported it occurring at least weekly. After treatment, 36% of respondents reported experiencing diarrhoea with 27% reporting it occurred only monthly (Figure 7e).

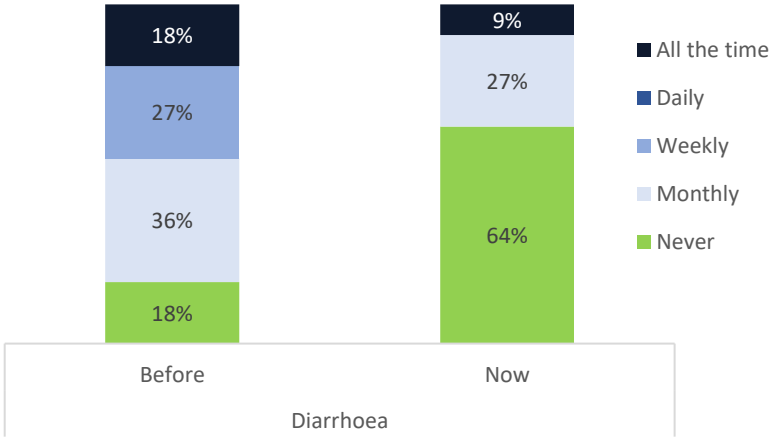


Figure 7e. Percentage of patients (n=11) who experienced diarrhoea before and after starting treatment with olipudase alfa

Abdominal cramping

Before starting treatment with olipudase alfa, 73% of respondents reported experiencing abdominal cramping with 18% reporting it at least daily. After treatment, the proportion reporting this symptom reduced to 36% with the proportion reporting it at least daily reducing to 9% (Figure 7f).

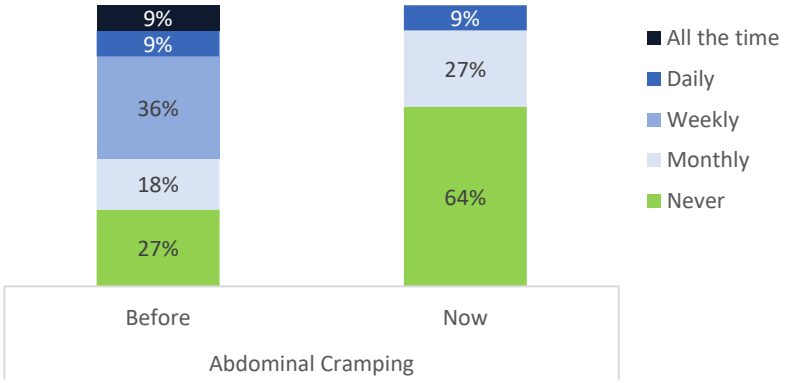


Figure 7f. Percentage of patients (n=11) who experienced abdominal cramping before and after treatment with olipudase alfa.

Tiredness and fatigue

Before starting treatment with olipudase alfa, 100% of respondents reported experiencing tiredness and fatigue with 45% reporting they always experienced it. After starting, 9% of respondents reported no longer experiencing tiredness, and it was reported as being less frequent with only 9% reported always experiencing it (Figure 7g).

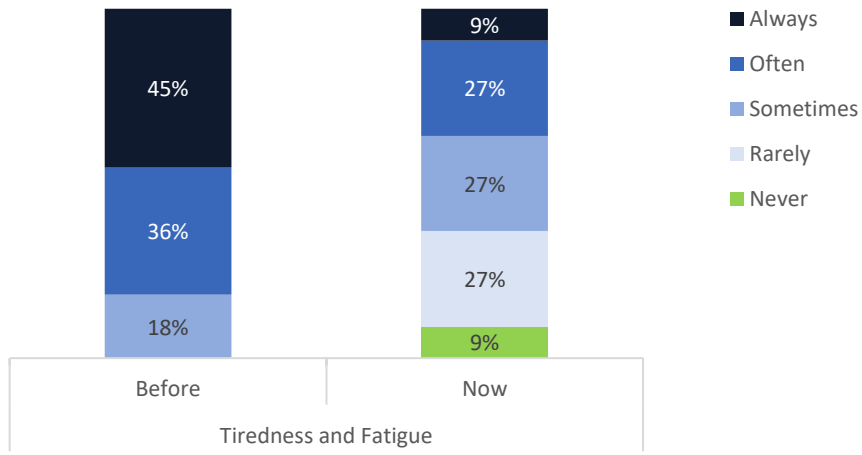


Figure 7g. Percentage of patients (n=11) who experienced tiredness and fatigue before and after treatment with olipudase alfa

Chronic Headaches

Before starting treatment with olipudase alfa, 91% of respondents reported experiencing chronic headaches with 36% reporting these as occurring often. After starting treatment with olipudase alfa, fewer respondents reported the symptom and there was a marked reduction in the number that reported they experienced chronic headaches often (Figure 7h).

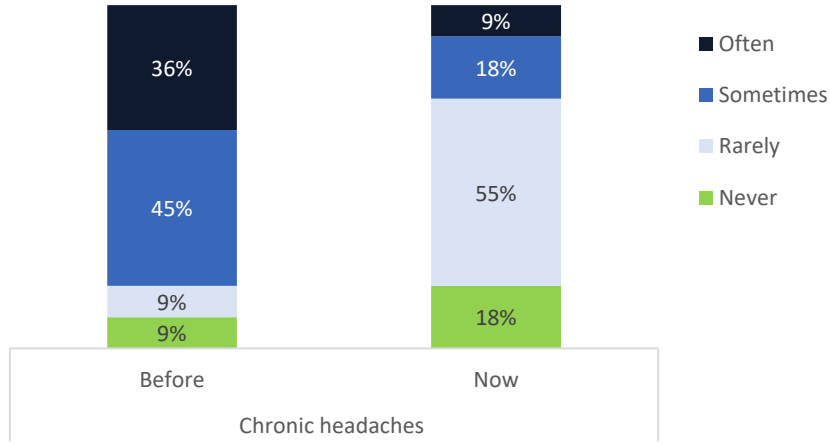


Figure 7h. Percentage of patients (n=11) who experienced chronic headaches before and after treatment with olipudase alfa

Impact of ASMD symptoms on day-to-day life before and since starting treatment with olipudase alfa

Respondents were asked about the impacts of ASMD symptoms experienced before treatment with olipudase alfa and now, after treatment. Respondents reported an overall positive impact on their day-to-day life with all symptoms. Most symptoms showed an increase in respondent's reporting a degree of impact of 'none at all' (Figure 8).

Bone pain

Forty five percent reported bone pain had no impact (none at all) on their day-to-day life before treatment, which increased to 64% reporting no impact since starting treatment. 9% reported 'quite a lot' before and after starting treatment with olipudase alfa.

Abdominal Pain

Eighteen percent reported abdominal pain had no impact (none at all) on their day-to-day life before treatment, which increased to 55% reporting no impact since starting treatment. 36% reported "quite a lot" before starting treatment and that reduced to 9% after starting treatment with olipudase alfa.

Shortness of breath

Eighteen percent reported shortness of breath had no impact (none at all) on their day-to-day life before treatment, which increased to 36% after starting treatment. 45% reported shortness of breath had "quite a lot" of impact on day-to-day life before starting treatment, decreasing to 9% after starting treatment with olipudase alfa.

Nosebleeds

Thirty six percent (4/11) reported nosebleeds had no impact (none at all) on their day-to-day life before treatment, which decreased to 9% after starting treatment. 45% reported nosebleeds had "some" impact on their day-to-day life before treatment, decreasing to none after starting treatment with olipudase alfa.

Diarrhoea

Twenty seven percent reported diarrhoea had no impact (none at all) on their day-to-day life before treatment, which increased to 73% after starting treatment. 27% reported diarrhoea had "very much" impact on their day-to-day life before started treatment, decreasing to none after starting treatment with olipudase alfa.

Abdominal cramping

Twenty seven percent reported abdominal cramping had no impact (none at all) on their day-to-day life before treatment, which increased to 55% after starting treatment. 36% reported abdominal cramping had

“quite a lot” of impact on their day-to-day life before starting treatment, decreasing to none after starting treatment with olipudase alfa.

Tiredness and fatigue

No respondents reported tiredness and fatigue had no impact (never) on their day-to-day life before treatment, increasing to 18% after starting treatment. In contrast, 36% reported that tiredness and fatigue “often” impacted day-to-day life before treatment decreasing to 9% after starting treatment with olipudase alfa.

Chronic headaches

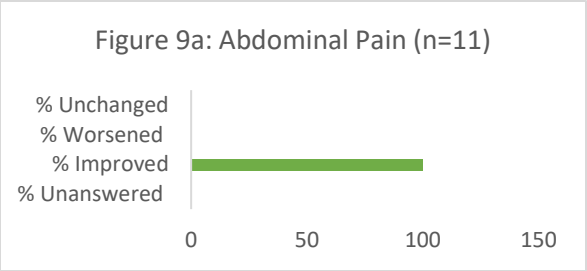
Nine percent reported chronic headaches had no impact (never) on their day-to-day life before treatment, increasing to 36% after starting treatment. In contrast, 64% reported that chronic headaches “sometimes” impacted their day-to-day life before treatment, decreasing to 27% after starting treatment with olipudase alfa.

Figure 8. Impact of symptoms on adults' day-to-day life before and since starting treatment with olipudase alfa

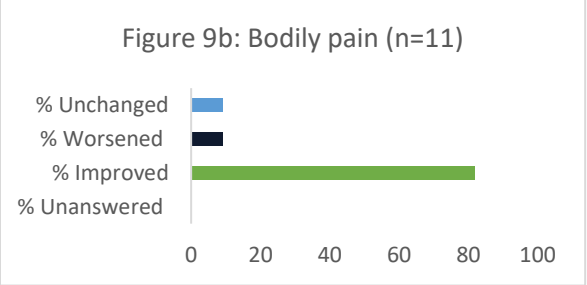
Overall change in symptoms and activities since treatment with olipudase alfa

Respondents reported the overall change in symptoms and activities since starting treatment with olipudase alfa:

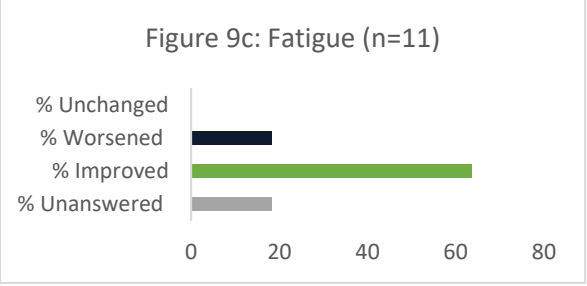
Abdominal pain: 100% of respondents reported their abdominal pain as "improved" since starting treatment with olipudase alfa. (Figure 9a)



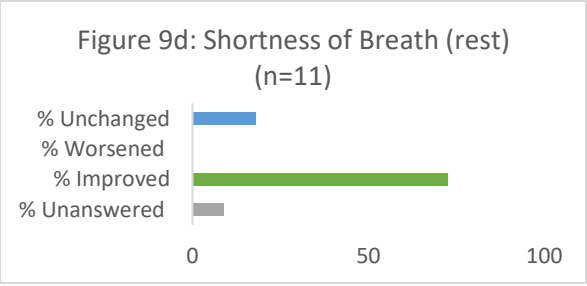
Bodily pain: 82% of respondents reported bodily pain as "improved" since starting treatment with olipudase alfa. 9% of respondents reported their bodily pain as "unchanged" and 9% reported it as "worsened". (Figure 9b)



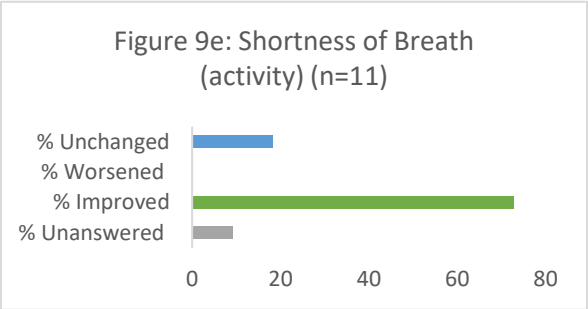
Fatigue: 64% of respondents reported fatigue as "improved" since starting treatment with olipudase alfa, while 18% reported it as "worsened". (Figure 9c)



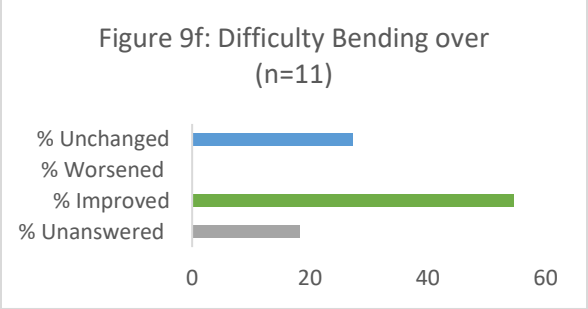
Shortness of breath (rest): 73% of respondents reported shortness of breath (rest) as "improved" since starting treatment with olipudase alfa, while 18% reported it as "unchanged". (Figure 9d)



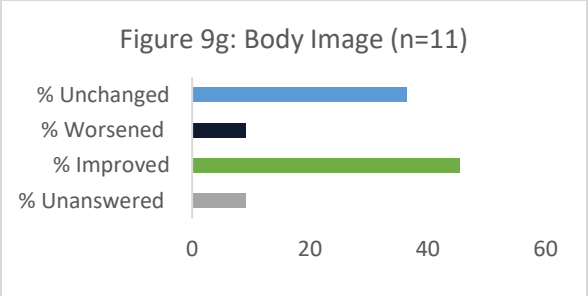
Shortness of breath (activity): 73% of respondents reported shortness of breath (activity) as "improved" since starting treatment with olipudase alfa, while 18% reported it as "unchanged". (Figure 9e)



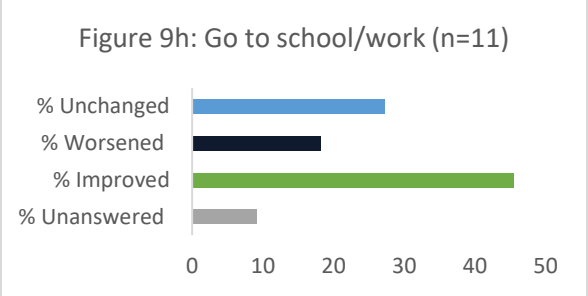
Difficulty bending over: 55% of respondents reported difficulty bending over as "improved" since starting treatment with olipudase alfa, while 27% reported it as "unchanged". (Figure 9f)



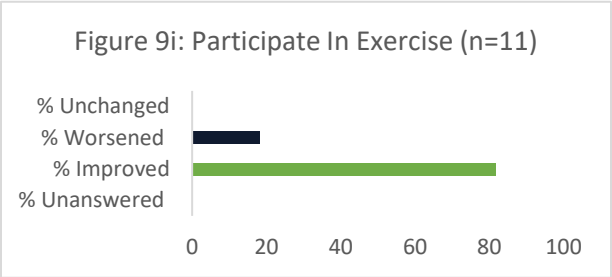
Body image: 45% of respondents reported body image as "improved" since starting treatment with olipudase alfa. 36% of respondents reported their body image as "unchanged" and 9% reported it as "worsened". (Figure 9g)



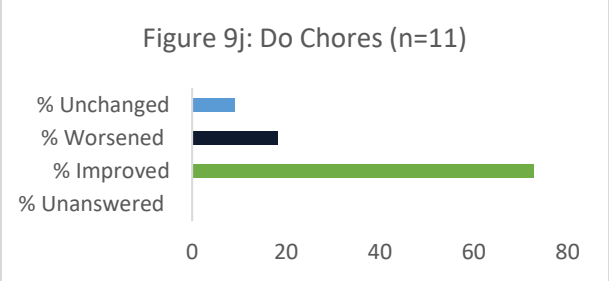
Go to school/work: 45% of respondents reported their ability to go to school/work as "improved" since starting treatment with olipudase alfa. 27% of respondents reported their a as ability to go to school/work as "unchanged" and 18% reported it as "worsened". (Figure 9h)



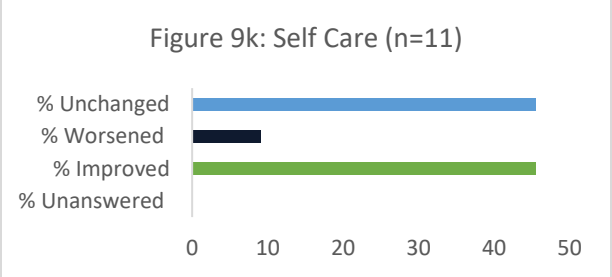
Participate in exercise: 82% of respondents reported their ability to participate in exercise as "improved" since starting treatment with olipudase alfa, while 18% reported it as "worsened". (Figure 9i)



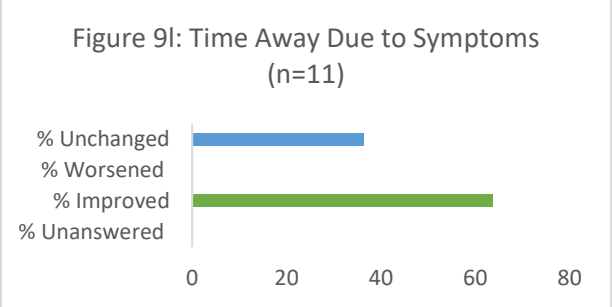
Do chores: 73% of respondents reported their ability to do chores as "improved" since starting treatment with olipudase alfa. 18% of respondents reported their a as ability to go to school/work as "worsened" and 9% reported it as "unchanged". (Figure 9j)



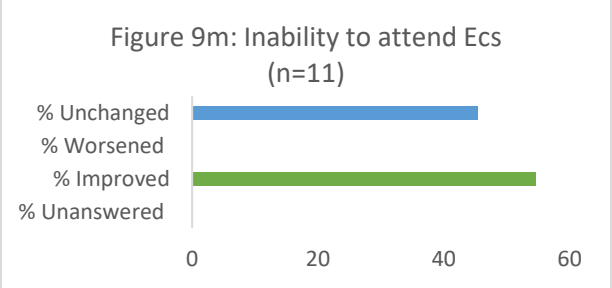
Self-care: 45% of respondents reported their self-care as "improved" since starting treatment with olipudase alfa. 45% of respondents reported their self-care as "unchanged" and 9% reported it as "worsened". (Figure 9k)



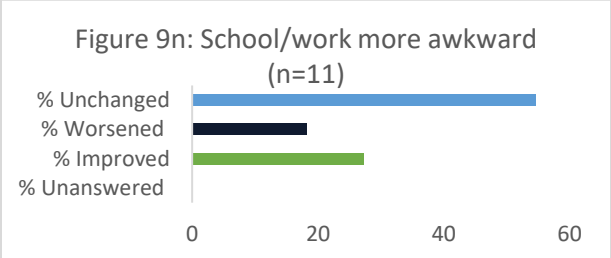
Time away due to symptoms: 64% of respondents reported taking time away due to symptoms as "improved" since starting treatment with olipudase alfa. 36% of respondents reported it as "unchanged". (Figure 9l)



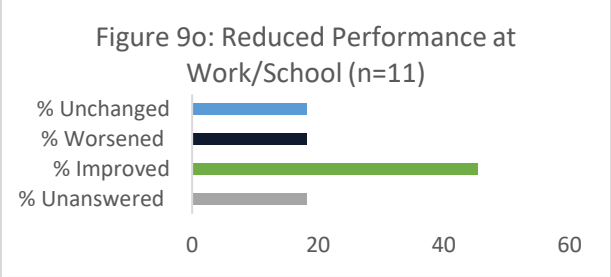
Inability to attend extracurricular activities: 55% of respondents reported their inability to attend extracurricular activities as "improved" since starting treatment with olipudase alfa. 36% of respondents reported it as "unchanged". (Figure 9m)



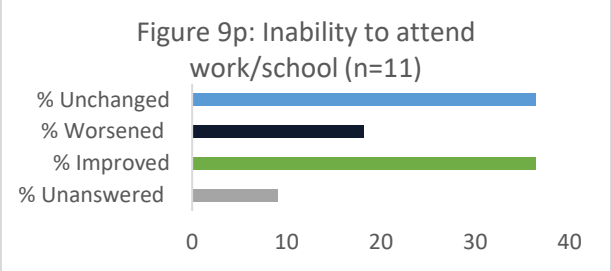
School/work more awkward: 27% of respondents reported school/work more awkward as "improved" since starting treatment with olipudase alfa. 55% of respondents reported it as "unchanged", and 18% reported it as "worsened". (Figure 9n)



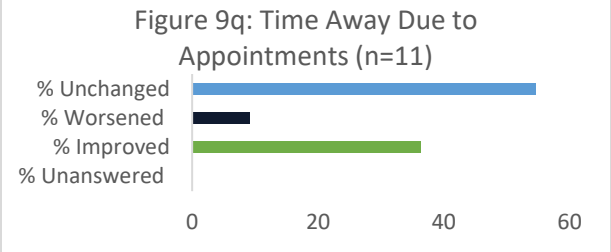
Reduced performance at school/work: 45% of respondents reported reduced performance at school/work as "improved" since starting treatment with olipudase alfa. 18% of respondents reported it as "unchanged", and 18% reported it as "worsened". (Figure 9o)



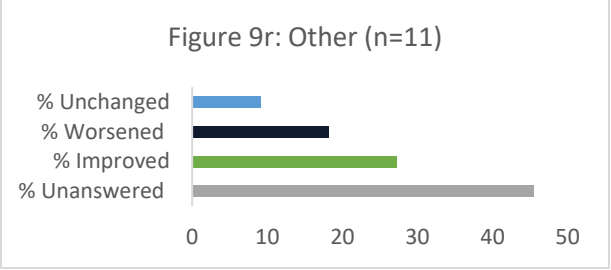
Inability to attend school/work: 36% of respondents reported an inability to attend work/school as "improved" since starting treatment with olipudase alfa. 36% of respondents reported it as "unchanged", and 18% reported it as "worsened". (Figure 9p)



Time away due to appointments: 36% of respondents reported taking time away due to appointments as "improved" since starting treatment with olipudase alfa. 55% of respondents reported it as "unchanged", and 9% reported it as "worsened". (Figure 9q)



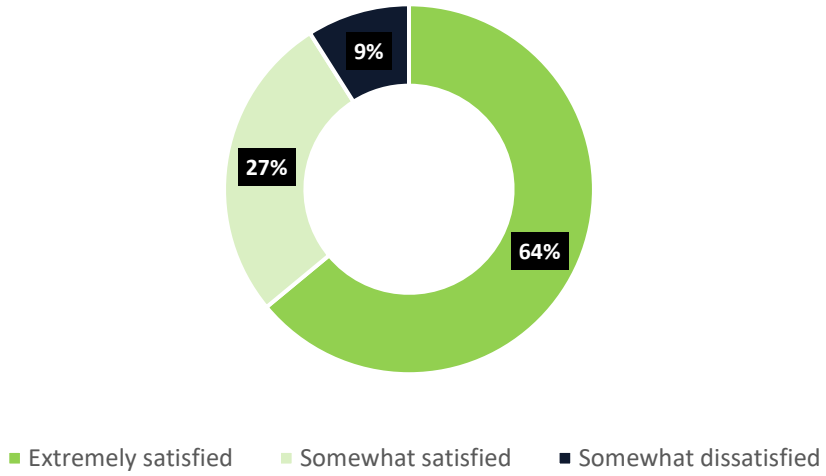
Other: 27% of respondents reported other symptoms and activities as "improved" since starting treatment with olipudase alfa. 9% of respondents reported it as "unchanged", and 18% reported it as "worsened". (Figure 9r)



Satisfaction with olipudase alfa

Participants were asked about the extent they were satisfied or dissatisfied with olipudase alfa. 64% of respondents were extremely satisfied with olipudase alfa to manage their symptoms of ASMD. 27% (3/11) were somewhat satisfied, while 9% (1/11) was somewhat dissatisfied with olipudase alfa in managing their symptoms of ASMD. (Figure 10)

Figure 10. Level of satisfaction with olipudase alfa to treat ASMD



> "Medical tests showed great improvement before I even reached maintenance dosage."

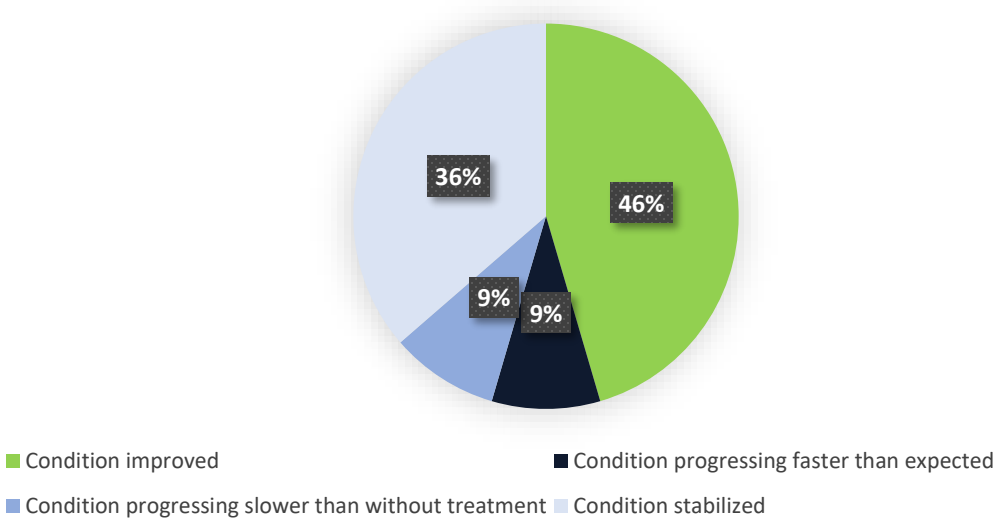
> "I'm happy we have a treatment. Unfortunately I have an inflammatory response on the second week which is unfortunately has sidelined me and keeps home a few days before my infusion."

> "It works very well!!!!!!!"

> "Infusions are hard on my veins but I don't want a port yet. Infusions are invasive in my life having a nurse in my home every two weeks. It is creepy letting someone put medicine in your veins and hope they don't cause you harm, a very helpless feeling. My retirement travel plans have to revolve around infusions. It is worrisome to possibly have to dose escalate again if I ever got off schedule. Getting insurance approval was stressful. A requested change in the amount of saline required additional approval and delayed my enzyme shipment and infusion. I lost my career years earlier than expected retirement. Now with trying to arrange enzyme shipments while traveling, I feel like my life is not my own. I have many more skin problems like rashes since being on enzyme. I still am super thankful for the enzyme."

To ascertain an understanding of global impression of disease change, participants were asked to choose the statement that best described the overall progression of ASMD while receiving treatment with olipudase alfa. Most respondents (45%; 5/11) reported that the 'condition improved'. 36% (4/11) chose the statement the 'condition stabilised'. 9% (1/11) chose 'condition progressing slower than without the treatment' and 9% (1/11) chose 'condition progressing faster than expected (Figure 11).

Fig 11. Global impression of disease burden since starting olipudase alfa



Key Conclusions

Symptoms experienced by patients with ASMD: Before treatment with olipudase alfa, all patients reported at least one symptom of ASMD with abdominal pain, tiredness & fatigue, chronic headaches, shortness of breath and diarrhoea most frequently reported. For most patients, symptoms were a frequent experience in their life. Almost half of patients reported tiredness and fatigue all the time and almost 40% reported shortness of breath every day while almost 80% reported abdominal pain at least weekly.

Impact of Olipudase Alfa on the patient experience: After treatment with olipudase alfa, all patients reported improvement in at least one symptom, with all patients reporting improvement in abdominal pain and approximately 80% reporting improvements in shortness of breath, bodily pain, and fatigue. A minority of respondents reported worsening symptoms in fatigue and bodily pain.

Regarding activities of daily life, almost 50% of patients reported improvement in their ability to perform activities since starting treatment with olipudase alfa, with most respondents reporting significant improvement in ability to participate in exercise (82%), ability to do chores (73%), time away due to

symptoms. Few respondents reported a worsening in their ability to perform activities such as ability to participate in exercise, ability to do chores and performance at work/school.

Satisfaction with Olipudase Alfa: 91% of respondents reported they were extremely satisfied or somewhat satisfied with olipudase alfa and 9% reporting they were somewhat dissatisfied. Many reported that with fewer symptoms of ASMD following treatment they can now lead a better life. Reported dissatisfaction was related, in part, to the burden of the treatment regimen (e.g. time commitment and related travel). Notably, all respondents reported a positive impact of olipudase alfa on ASMD disease burden.

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4. Imrie J. A guide to ASMD Niemann-Pick disease types A and B: Understanding acid sphingomyelinase deficient Niemann-Pick disease types A and B and their potential treatment. 1st ed. Washington: Niemann-Pick Disease Group (UK); 2010.