



Clinical trial results:

A Phase 3, Randomized, Double-Blind, Placebo-Controlled, Multi-Center Study Confirming the Efficacy and Safety of Genz-112638 in Patients With Gaucher Disease Type 1 (ENGAGE)

Summary

| | |
|--------------------------|-----------------|
| EudraCT number | 2008-005222-37 |
| Trial protocol | NL GB BG |
| Global end of trial date | 21 January 2016 |

Results information

| | |
|--------------------------------|---|
| Result version number | v2 |
| This version publication date | 06 August 2016 |
| First version publication date | 01 June 2016 |
| Version creation reason | <ul style="list-style-type: none">Changes to summary attachments Summary attachment with primary results replaced by full data set including primary and follow-up results. |

Trial information

Trial identification

| | |
|-----------------------|-----------|
| Sponsor protocol code | GZGD02507 |
|-----------------------|-----------|

Additional study identifiers

| | |
|------------------------------------|--------------------|
| ISRCTN number | - |
| ClinicalTrials.gov id (NCT number) | NCT00891202 |
| WHO universal trial number (UTN) | - |
| Other trial identifiers | Study name: ENGAGE |

Notes:

Sponsors

| | |
|------------------------------|--|
| Sponsor organisation name | Genzyme, a Sanofi Company |
| Sponsor organisation address | 500 Kendall Street, Cambridge, MA, United States, 02142 |
| Public contact | Trial Transparency Team, Sanofi aventis recherche & développement, Contact-US@sanofi.com |
| Scientific contact | Trial Transparency Team, Sanofi aventis recherche & développement, Contact-US@sanofi.com |

Notes:

Paediatric regulatory details

| | |
|--|-----|
| Is trial part of an agreed paediatric investigation plan (PIP) | No |
| Does article 45 of REGULATION (EC) No 1901/2006 apply to this trial? | No |
| Does article 46 of REGULATION (EC) No 1901/2006 apply to this trial? | Yes |

Notes:

Results analysis stage

| | |
|--|-------------|
| Analysis stage | Final |
| Date of interim/final analysis | 03 May 2016 |
| Is this the analysis of the primary completion data? | No |

| | |
|----------------------------------|-----------------|
| Global end of trial reached? | Yes |
| Global end of trial date | 21 January 2016 |
| Was the trial ended prematurely? | No |

Notes:

General information about the trial

Main objective of the trial:

To confirm the efficacy and safety of Genz-112638 after 39 weeks of treatment in subjects with Gaucher disease type 1.

Protection of trial subjects:

Subjects were fully informed of all pertinent aspects of the clinical trial as well as the possibility to discontinue at any time in language and terms appropriate for the subject and considering the local culture. During the course of the trial, subjects were provided with individual subject cards indicating the nature of the trial the subject is participating, contact details and any information needed in the event of a medical emergency. Collected personal data and human biological samples were processed in compliance with the Sanofi-Aventis Group Personal Data Protection Charter ensuring that the Group abides by the laws governing personal data protection in force in all countries in which it operates.

Background therapy: -

Evidence for comparator: -

| | |
|---|------------------|
| Actual start date of recruitment | 05 November 2009 |
| Long term follow-up planned | No |
| Independent data monitoring committee (IDMC) involvement? | Yes |

Notes:

Population of trial subjects**Subjects enrolled per country**

| | |
|--------------------------------------|------------------------|
| Country: Number of subjects enrolled | Bulgaria: 1 |
| Country: Number of subjects enrolled | Canada: 3 |
| Country: Number of subjects enrolled | Colombia: 1 |
| Country: Number of subjects enrolled | India: 1 |
| Country: Number of subjects enrolled | Israel: 2 |
| Country: Number of subjects enrolled | Lebanon: 2 |
| Country: Number of subjects enrolled | Mexico: 1 |
| Country: Number of subjects enrolled | Russian Federation: 10 |
| Country: Number of subjects enrolled | Serbia: 2 |
| Country: Number of subjects enrolled | Tunisia: 6 |
| Country: Number of subjects enrolled | United Kingdom: 2 |
| Country: Number of subjects enrolled | United States: 9 |
| Worldwide total number of subjects | 40 |
| EEA total number of subjects | 3 |

Notes:

Subjects enrolled per age group

| | |
|---|----|
| In utero | 0 |
| Preterm newborn - gestational age < 37 wk | 0 |
| Newborns (0-27 days) | 0 |
| Infants and toddlers (28 days-23 months) | 0 |
| Children (2-11 years) | 0 |
| Adolescents (12-17 years) | 2 |
| Adults (18-64 years) | 38 |
| From 65 to 84 years | 0 |
| 85 years and over | 0 |

Subject disposition

Recruitment

Recruitment details:

A total of 72 subjects were screened between 5 November 2009 and 29 July 2011, of which 32 subjects were screen failure. Overall 40 subjects were enrolled and the study was conducted in 18 centres in 12 countries.

Pre-assignment

Screening details:

The 40 subjects who met inclusion criteria received placebo or Genz-112638 (eliglustat tartrate) during 39 weeks primary analysis period (PAP). After week 39 of the PAP, all subjects who remained in the study received Genz-112638 in the long-term treatment period (LTP).

Period 1

| | |
|------------------------------|--|
| Period 1 title | PAP (Up To Week 39) |
| Is this the baseline period? | Yes |
| Allocation method | Randomised - controlled |
| Blinding used | Double blind |
| Roles blinded | Subject, Investigator, Carer, Assessor |

Arms

| | |
|------------------------------|---------|
| Are arms mutually exclusive? | Yes |
| Arm title | Placebo |

Arm description:

On Day-1 of PAP, subjects received placebo (50 mg) + placebo (100 mg) in the morning. From Day 2 to Week 39, subjects received placebo (50 mg) + placebo (100 mg) twice daily (BID). After Week 39, all subjects entered into LTP.

| | |
|--|----------|
| Arm type | Placebo |
| Investigational medicinal product name | Placebo |
| Investigational medicinal product code | |
| Other name | |
| Pharmaceutical forms | Capsule |
| Routes of administration | Oral use |

Dosage and administration details:

Matching placebo to Genz-112638 (50 mg or 100 mg) was given to subjects.

| | |
|------------------|-------------|
| Arm title | Genz-112638 |
|------------------|-------------|

Arm description:

On Day-1 of PAP, subjects received combination of Genz-112638 (50 mg) and placebo (100 mg) in the morning. From Day 2 to Week 4, combination of Genz-112638 (50 mg) and placebo (100 mg) BID were given. Depending upon plasma trough and 2-hour peak concentrations of Genz-112638 at Week 2, subjects received Genz-112638 (100 mg) + placebo (50 mg) or Genz-112638 (50 mg) + placebo (100 mg) BID from Week 4 to Week 39. After Week 39, all subjects entered into LTP.

| | |
|--|---------------------|
| Arm type | Experimental |
| Investigational medicinal product name | Genz-112638 |
| Investigational medicinal product code | Eliglustat tartrate |
| Other name | |
| Pharmaceutical forms | Capsule |
| Routes of administration | Oral use |

Dosage and administration details:

Depending upon Genz-112638 plasma trough concentration of < 5 ng/mL or ≥ 5 ng/mL at Week 2, subjects received Genz-112638 (100 mg) + placebo (50 mg) or Genz-112638 (50 mg) + placebo (100 mg) BID from Week 4 to Week 39. After Week 39, all subjects entered into LTP.

mg) BID from Week 4 to Week 39 respectively.

| Number of subjects in period 1 | Placebo | Genz-112638 |
|--------------------------------|---------|-------------|
| Started | 20 | 20 |
| Completed | 20 | 19 |
| Not completed | 0 | 1 |
| Consent withdrawn by subject | - | 1 |

Period 2

| | |
|------------------------------|---------------------------------------|
| Period 2 title | LTPP (Extension Period After Week 39) |
| Is this the baseline period? | No |
| Allocation method | Not applicable |
| Blinding used | Not blinded |

Arms

| | |
|------------------------------|---|
| Are arms mutually exclusive? | Yes |
| Arm title | LTPP: Genz-112638 (originally on placebo) |

Arm description:

All subjects of the placebo arm in PAP who completed PAP were included in LTPP and received Genz-112638 until study completion. Day 1 (post week 39) was considered as baseline for LTPP. On Day 1 all subjects received Genz--112638 (50 mg) BID until Week 43. Depending upon plasma trough and 4-hour peak concentrations of Genz--112638 at Week 41, subjects received Genz--112638 (50 mg or 100 mg) BID from Week 43 to Week 47. Depending upon plasma trough and 4-hour peak concentrations of Genz--112638 at Week 45, subjects received Genz--112638 (50 mg or 100 mg or 150 mg) BID from Week 47 until study completion.

| | |
|--|---------------------|
| Arm type | Experimental |
| Investigational medicinal product name | Genz-112638 |
| Investigational medicinal product code | Eliglustat tartrate |
| Other name | |
| Pharmaceutical forms | Capsule |
| Routes of administration | Oral use |

Dosage and administration details:

Depending upon Genz--112638 plasma trough concentration of < 5 ng/mL or ≥ 5 ng/mL at Week 41, subjects received Genz--112638 (100 mg) or Genz--112638 (50 mg) BID from Week 43 to Week 47 respectively. At Week 45, if Genz--112638 plasma trough concentration was < 5 ng/mL, then subjects previously on 50 mg BID dose received Genz--112638 (100 mg) BID and subjects previously on 100 mg BID dose received Genz--112638 (150 mg) BID or if Genz--112638 plasma trough concentration was ≥ 5 ng/mL, subjects previously on Genz--112638 (50 mg or 100 mg) BID dose continued on same dose (50 mg or 100 mg) BID from Week 47 until study completion.

| | |
|------------------|---|
| Arm title | LTPP: Genz-112638 (originally on Genz-112638) |
|------------------|---|

Arm description:

On Day 1 of LTTP, all subjects received Genz-112638 (50 mg) BID until Week 43. Depending upon plasma trough and 4--hour peak concentrations of Genz--112638 at Week 41, subjects received Genz--112638 (50 mg or 100 mg) BID from Week 43 to Week 47. Depending upon plasma trough and 4--hour peak concentrations of Genz--112638 at Week 45, subjects received Genz--112638 (50 mg or 100 mg or 150 mg) BID from Week 47 until study completion.

| | |
|--|---------------------|
| Arm type | Experimental |
| Investigational medicinal product name | Genz-112638 |
| Investigational medicinal product code | Eliglustat tartrate |
| Other name | |
| Pharmaceutical forms | Capsule |
| Routes of administration | Oral use |

Dosage and administration details:

Depending upon Genz--112638 plasma trough concentration of < 5 ng/mL or ≥ 5 ng/mL at Week 41, subjects received Genz--112638 (100 mg) or Genz--112638 (50 mg) BID from Week 43 to Week 47 respectively. At Week 45, if Genz--112638 plasma trough concentration was < 5 ng/mL, then subjects previously on 50 mg BID dose received Genz--112638 (100 mg) BID and subjects previously on 100 mg BID dose received Genz--112638 (150 mg) BID or if Genz--112638 plasma trough concentration was ≥ 5 ng/mL, subjects previously on Genz--112638 (50 mg or 100 mg) BID dose continued on same dose (50 mg or 100 mg) BID from Week 47 until study completion.

| Number of subjects in period 2 | LTTP: Genz-112638 (originally on placebo) | LTTP: Genz-112638 (originally on Genz- 112638) |
|---------------------------------------|---|--|
| Started | 20 | 19 |
| Completed | 15 | 11 |
| Not completed | 5 | 8 |
| Consent withdrawn by subject | - | 5 |
| Other | 5 | 2 |
| Pregnancy | - | 1 |

Baseline characteristics

Reporting groups

| | |
|-----------------------|---------|
| Reporting group title | Placebo |
|-----------------------|---------|

Reporting group description:

On Day-1 of PAP, subjects received placebo (50 mg) + placebo (100 mg) in the morning. From Day 2 to Week 39, subjects received placebo (50 mg) + placebo (100 mg) twice daily (BID). After Week 39, all subjects entered into LTTP.

| | |
|-----------------------|-------------|
| Reporting group title | Genz-112638 |
|-----------------------|-------------|

Reporting group description:

On Day-1 of PAP, subjects received combination of Genz-112638 (50 mg) and placebo (100 mg) in the morning. From Day 2 to Week 4, combination of Genz-112638 (50 mg) and placebo (100 mg) BID were given. Depending upon plasma trough and 2-hour peak concentrations of Genz-112638 at Week 2, subjects received Genz-112638 (100 mg) + placebo (50 mg) or Genz-112638 (50 mg) + placebo (100 mg) BID from Week 4 to Week 39. After Week 39, all subjects entered into LTTP.

| Reporting group values | Placebo | Genz-112638 | Total |
|------------------------|---------|-------------|-------|
| Number of subjects | 20 | 20 | 40 |
| Age categorical | | | |
| Units: Subjects | | | |

| | | | |
|--|---------|---------|----|
| Age continuous | | | |
| Units: years | | | |
| arithmetic mean | 32.1 | 31.6 | - |
| standard deviation | ± 11.26 | ± 11.55 | - |
| Gender categorical | | | |
| Units: Subjects | | | |
| Female | 8 | 12 | 20 |
| Male | 12 | 8 | 20 |
| Race | | | |
| Units: Subjects | | | |
| White | 20 | 19 | 39 |
| Asian | 0 | 1 | 1 |
| Ethnicity | | | |
| Units: Subjects | | | |
| Not Hispanic or Latino | 20 | 18 | 38 |
| Hispanic or Latino | 0 | 2 | 2 |
| Body Mass Index (BMI) | | | |
| BMI was calculated as ([weight in kg] divided by [height in cm multiplied by 0.01] ²). | | | |
| Units: kg/m ² | | | |
| arithmetic mean | 23.4 | 23.3 | - |
| standard deviation | ± 3.54 | ± 2.74 | - |
| Weight | | | |
| Units: kg | | | |
| arithmetic mean | 68.6 | 64.8 | - |
| standard deviation | ± 17.17 | ± 11.74 | - |
| Height | | | |
| Units: cm | | | |
| arithmetic mean | 170 | 166.2 | |

| | | | |
|--------------------|-------------|------------|---|
| standard deviation | ± 12.02 | ± 9.91 | - |
|--------------------|-------------|------------|---|

End points

End points reporting groups

| | |
|--|---|
| Reporting group title | Placebo |
| Reporting group description: On Day-1 of PAP, subjects received placebo (50 mg) + placebo (100 mg) in the morning. From Day 2 to Week 39, subjects received placebo (50 mg) + placebo (100 mg) twice daily (BID). After Week 39, all subjects entered into LTTP. | |
| Reporting group title | Genz-112638 |
| Reporting group description: On Day-1 of PAP, subjects received combination of Genz-112638 (50 mg) and placebo (100 mg) in the morning. From Day 2 to Week 4, combination of Genz-112638 (50 mg) and placebo (100 mg) BID were given. Depending upon plasma trough and 2-hour peak concentrations of Genz-112638 at Week 2, subjects received Genz-112638 (100 mg) + placebo (50 mg) or Genz-112638 (50 mg) + placebo (100 mg) BID from Week 4 to Week 39. After Week 39, all subjects entered into LTTP. | |
| Reporting group title | LTTP: Genz-112638 (originally on placebo) |
| Reporting group description: All subjects of the placebo arm in PAP who completed PAP were included in LTTP and received Genz-112638 until study completion. Day 1 (post week 39) was considered as baseline for LTTP. On Day 1 all subjects received Genz--112638 (50 mg) BID until Week 43. Depending upon plasma trough and 4--hour peak concentrations of Genz--112638 at Week 41, subjects received Genz--112638 (50 mg or 100 mg) BID from Week 43 to Week 47. Depending upon plasma trough and 4--hour peak concentrations of Genz--112638 at Week 45, subjects received Genz--112638 (50 mg or 100 mg or 150 mg) BID from Week 47 until study completion. | |
| Reporting group title | LTTP: Genz-112638 (originally on Genz-112638) |
| Reporting group description: On Day 1 of LTTP, all subjects received Genz-112638 (50 mg) BID until Week 43. Depending upon plasma trough and 4--hour peak concentrations of Genz--112638 at Week 41, subjects received Genz--112638 (50 mg or 100 mg) BID from Week 43 to Week 47. Depending upon plasma trough and 4--hour peak concentrations of Genz--112638 at Week 45, subjects received Genz--112638 (50 mg or 100 mg or 150 mg) BID from Week 47 until study completion. | |

Primary: Percent Change From Baseline in Spleen Volume (in multiples of normal [MN]) at Week 39 With Genz-112638 Treatment as Compared to Placebo

| | |
|---|--|
| End point title | Percent Change From Baseline in Spleen Volume (in multiples of normal [MN]) at Week 39 With Genz-112638 Treatment as Compared to Placebo |
| End point description: Percent change in spleen volume = ([spleen volume at Week 39 minus spleen volume at baseline] divided by [spleen volume at baseline]) multiplied by 100, where all volumes were in MN. Analysis was performed on full analysis set (FAS) included all subjects who signed informed consent and received at least one dose of Genz-112638. | |
| End point type | Primary |
| End point timeframe: Baseline, Week 39 | |

| End point values | Placebo | Genz-112638 | | |
|-------------------------------------|--------------------|----------------------|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 20 | 20 | | |
| Units: percent change | | | | |
| least squares mean (standard error) | 2.26 (\pm 2.37) | -27.77 (\pm 2.37) | | |

Statistical analyses

| Statistical analysis title | Placebo vs Genz-112638 |
|--|-------------------------------|
| Statistical analysis description: | |
| Analysis was performed using analysis of covariance (ANCOVA) model fitted with treatment and baseline spleen severity (low spleen severity: spleen volume less than or equal to [\leq] 20 multiples of normal spleen volume, high spleen severity: spleen volume greater than ($>$) 20 multiples of normal spleen volume). | |
| Comparison groups | Genz-112638 v Placebo |
| Number of subjects included in analysis | 40 |
| Analysis specification | Pre-specified |
| Analysis type | superiority |
| P-value | < 0.0001 |
| Method | ANCOVA |
| Parameter estimate | Least squares mean difference |
| Point estimate | -30.03 |
| Confidence interval | |
| level | 95 % |
| sides | 2-sided |
| lower limit | -36.82 |
| upper limit | -23.24 |
| Variability estimate | Standard error of the mean |
| Dispersion value | 3.35 |

Secondary: Hemoglobin Level at Baseline

| | |
|--|------------------------------|
| End point title | Hemoglobin Level at Baseline |
| End point description: | |
| Analysis was performed FAS population. | |
| End point type | Secondary |
| End point timeframe: | |
| Baseline | |

| End point values | Placebo | Genz-112638 | | |
|--------------------------------------|----------------------|----------------------|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 20 | 20 | | |
| Units: g/dL | | | | |
| arithmetic mean (standard deviation) | 12.75 (\pm 1.629) | 12.05 (\pm 1.816) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Absolute Change From Baseline in Hemoglobin Level at Week 39

| | |
|-----------------|--|
| End point title | Absolute Change From Baseline in Hemoglobin Level at Week 39 |
|-----------------|--|

End point description:

Absolute change = hemoglobin level at Week 39 minus hemoglobin level at baseline. Analysis was performed on FAS population.

| | |
|----------------|-----------|
| End point type | Secondary |
|----------------|-----------|

End point timeframe:

Baseline, Week 39

| End point values | Placebo | Genz-112638 | | |
|-------------------------------------|---------------------|--------------------|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 20 | 20 | | |
| Units: g/dL | | | | |
| least squares mean (standard error) | -0.54 (\pm 0.23) | 0.69 (\pm 0.23) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Percent Change From Baseline in Liver Volume (in MN) at Week 39

| | |
|-----------------|---|
| End point title | Percent Change From Baseline in Liver Volume (in MN) at Week 39 |
|-----------------|---|

End point description:

Percent change in liver volume = ([liver volume at Week 39 minus liver volume at baseline] divided by [liver volume at baseline]) multiplied by 100, where all volumes are in MN. Analysis was performed FAS population.

| | |
|----------------|-----------|
| End point type | Secondary |
|----------------|-----------|

End point timeframe:

Baseline, Week 39

| End point values | Placebo | Genz-112638 | | |
|-------------------------------------|-----------------|-----------------|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 20 | 20 | | |
| Units: percent change | | | | |
| least squares mean (standard error) | 1.44 (± 1.64) | -5.2 (± 1.64) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Percent Change From Baseline in Platelet Counts at Week 39

| | |
|-----------------|--|
| End point title | Percent Change From Baseline in Platelet Counts at Week 39 |
|-----------------|--|

End point description:

Percent change in platelet count = ([platelet count at Week 39 minus platelet count at baseline] divided by [platelet count at baseline]) multiplied by 100. Analysis was performed FAS population.

| | |
|----------------|-----------|
| End point type | Secondary |
|----------------|-----------|

End point timeframe:

Baseline, Week 39

| End point values | Placebo | Genz-112638 | | |
|-------------------------------------|-----------------|-----------------|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 20 | 20 | | |
| Units: percent change | | | | |
| least squares mean (standard error) | -9.06 (± 5.95) | 32 (± 5.95) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Percent Change From Baseline in Spleen Volume (in MN) at Week 234 With Genz--112638 Treatment

| | |
|-----------------|---|
| End point title | Percent Change From Baseline in Spleen Volume (in MN) at Week 234 With Genz--112638 Treatment |
|-----------------|---|

End point description:

Percent change in spleen volume = ([spleen volume at Week 234 minus spleen volume at baseline] divided by [spleen volume at baseline]) multiplied by 100, where all volumes are in MN. Baseline values for the original placebo subjects refer to Day 1 of LTTP and baseline values for the original Genz--112638 subjects refer to the Day 1 of PAP. Analysis was performed ITT (intent--to--treat) population included all subjects who receive at least 1 dose of Genz--112638 or placebo. Here n= number of subjects for each category.

| | |
|----------------|-----------|
| End point type | Secondary |
|----------------|-----------|

End point timeframe:

Baseline, Week 234

| End point values | LTPP: Genz-112638 (originally on placebo) | LTPP: Genz-112638 (originally on Genz-112638) | | |
|--------------------------------------|--|--|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 6 | 7 | | |
| Units: Percent Change | | | | |
| arithmetic mean (standard deviation) | -64 (± 6.43) | -66.9 (± 8.45) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Absolute Change from Baseline in Hemoglobin Level at Week 234

| | |
|-----------------|---|
| End point title | Absolute Change from Baseline in Hemoglobin Level at Week 234 |
|-----------------|---|

End point description:

Baseline values for the original placebo subjects refer to Day 1 of LTPP and baseline values for the original Genz--112638 subjects refer to the Day 1 of PAP. Analysis was performed ITT population. Here n= number of subjects for each category.

| | |
|----------------|-----------|
| End point type | Secondary |
|----------------|-----------|

End point timeframe:

Baseline, Week 234

| End point values | LTPP: Genz-112638 (originally on placebo) | LTPP: Genz-112638 (originally on Genz-112638) | | |
|--------------------------------------|--|--|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 5 | 7 | | |
| Units: g/dL | | | | |
| arithmetic mean (standard deviation) | 1.9 (± 1.88) | 1.1 (± 0.65) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Percent Change From Baseline in Liver Volume (in MN) at Week 234

| | |
|-----------------|--|
| End point title | Percent Change From Baseline in Liver Volume (in MN) at Week 234 |
|-----------------|--|

End point description:

Percent change in platelet count = ([platelet count at Week 234 minus platelet count at baseline]

divided by [platelet count at baseline]) multiplied by 100. Baseline values for the original placebo subjects refer to Day 1 of LTTP and baseline values for the original Genz--112638 subjects refer to the Day 1 of PAP. Analysis was performed ITT population. Here n= number of subjects for each category.

| | |
|----------------------|-----------|
| End point type | Secondary |
| End point timeframe: | |
| Baseline, Week 234 | |

| End point values | LTTP: Genz-112638 (originally on placebo) | LTTP: Genz-112638 (originally on Genz-112638) | | |
|--------------------------------------|--|--|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 6 | 7 | | |
| Units: percent change | | | | |
| arithmetic mean (standard deviation) | -22.4 (± 10.77) | -24.3 (± 11.21) | | |

Statistical analyses

No statistical analyses for this end point

Secondary: Percent Change From Baseline in Platelet Counts at Week 234

| | |
|--|---|
| End point title | Percent Change From Baseline in Platelet Counts at Week 234 |
| End point description: | |
| Percent change in platelet count = ([platelet count at Week 234 minus platelet count at baseline] divided by [platelet count at baseline]) multiplied by 100. Baseline values for the original placebo subjects refer to Day 1 of LTTP and baseline values for the original Genz--112638 subjects refer to the Day 1 of PAP. | |
| Analysis was performed ITT population. Here n= number of subjects for each category. | |
| End point type | Secondary |
| End point timeframe: | |
| Baseline, Week 234 | |

| End point values | LTTP: Genz-112638 (originally on placebo) | LTTP: Genz-112638 (originally on Genz-112638) | | |
|--------------------------------------|--|--|--|--|
| Subject group type | Reporting group | Reporting group | | |
| Number of subjects analysed | 5 | 7 | | |
| Units: Percent Change | | | | |
| arithmetic mean (standard deviation) | 100.1 (± 80.69) | 77.3 (± 28.17) | | |

Statistical analyses

Adverse events

Adverse events information

Timeframe for reporting adverse events:

AEs were collected from the signature of the Informed Consent Form through the follow-up period (30-37 days after the last visit, which was Week 286).

Adverse event reporting additional description:

Reported adverse events and death are treatment-emergent that is AEs that developed/worsened and death that occurred during the 'on treatment period' (first dose of Genz-112638 to end of safety follow-up period).

| | |
|-----------------|------------|
| Assessment type | Systematic |
|-----------------|------------|

Dictionary used

| | |
|--------------------|--------|
| Dictionary name | MedDRA |
| Dictionary version | 18.0 |

Reporting groups

| | |
|-----------------------|---------|
| Reporting group title | Placebo |
|-----------------------|---------|

Reporting group description:

On Day-1 of PAP, subjects received placebo (50 mg) + placebo (100 mg) in the morning. From Day 2 to Week 39, subjects received placebo (50 mg) + placebo (100 mg) twice daily (BID). After Week 39, all subjects entered into LTTP. Day 1 (post week 39) was considered as baseline for LTTP. On Day 1 all subjects received Genz--112638 (50 mg) BID until Week 43. Depending upon plasma trough and 4-hour peak concentrations of Genz--112638 at Week 41, subjects received Genz--112638 (50 mg or 100 mg) BID from Week 43 to Week 47. Depending upon plasma trough and 4-hour peak concentrations of Genz--112638 at Week 45, subjects received Genz--112638 (50 mg or 100 mg or 150 mg) BID from Week 47 until study completion.

| | |
|-----------------------|--------------|
| Reporting group title | Genz--112638 |
|-----------------------|--------------|

Reporting group description:

On Day-1 of PAP, subjects received combination of Genz-112638 (50 mg) and placebo (100 mg) in the morning. From Day 2 to Week 4, combination of Genz-112638 (50 mg) and placebo (100 mg) BID were given. Depending upon plasma trough and 2-hour peak concentrations of Genz-112638 at Week 2, subjects received Genz-112638 (100 mg) + placebo (50 mg) or Genz-112638 (50 mg) + placebo (100 mg) BID from Week 4 to Week 39. After Week 39, all subjects entered into LTTP. On Day 1 of LTTP, all subjects received Genz-112638 (50 mg) BID until Week 43. Depending upon plasma trough and 4-hour peak concentrations of Genz--112638 at Week 41, subjects received Genz--112638 (50 mg or 100 mg) BID from Week 43 to Week 47. Depending upon plasma trough and 4-hour peak concentrations of Genz--112638 at Week 45, subjects received Genz--112638 (50 mg or 100 mg or 150 mg) BID from Week 47 until study completion.

| Serious adverse events | Placebo | Genz--112638 | |
|---|-----------------|-----------------|--|
| Total subjects affected by serious adverse events | | | |
| subjects affected / exposed | 3 / 20 (15.00%) | 2 / 20 (10.00%) | |
| number of deaths (all causes) | 0 | 0 | |
| number of deaths resulting from adverse events | | | |
| Cardiac disorders | | | |
| Atrioventricular Block | | | |
| subjects affected / exposed | 0 / 20 (0.00%) | 1 / 20 (5.00%) | |
| occurrences causally related to treatment / all | 0 / 0 | 1 / 1 | |
| deaths causally related to treatment / all | 0 / 0 | 0 / 0 | |

| | | | |
|---|-----------------|----------------|--|
| Atrioventricular Block Second Degree | | | |
| subjects affected / exposed | 0 / 20 (0.00%) | 1 / 20 (5.00%) | |
| occurrences causally related to treatment / all | 0 / 0 | 1 / 1 | |
| deaths causally related to treatment / all | 0 / 0 | 0 / 0 | |
| Ventricular Tachycardia | | | |
| subjects affected / exposed | 0 / 20 (0.00%) | 1 / 20 (5.00%) | |
| occurrences causally related to treatment / all | 0 / 0 | 0 / 1 | |
| deaths causally related to treatment / all | 0 / 0 | 0 / 0 | |
| Hepatobiliary disorders | | | |
| Biliary Colic | | | |
| subjects affected / exposed | 1 / 20 (5.00%) | 0 / 20 (0.00%) | |
| occurrences causally related to treatment / all | 0 / 1 | 0 / 0 | |
| deaths causally related to treatment / all | 0 / 0 | 0 / 0 | |
| Musculoskeletal and connective tissue disorders | | | |
| Osteoarthritis | | | |
| subjects affected / exposed | 0 / 20 (0.00%) | 1 / 20 (5.00%) | |
| occurrences causally related to treatment / all | 0 / 0 | 0 / 1 | |
| deaths causally related to treatment / all | 0 / 0 | 0 / 0 | |
| Infections and infestations | | | |
| Appendicitis | | | |
| subjects affected / exposed | 2 / 20 (10.00%) | 0 / 20 (0.00%) | |
| occurrences causally related to treatment / all | 0 / 2 | 0 / 0 | |
| deaths causally related to treatment / all | 0 / 0 | 0 / 0 | |

Frequency threshold for reporting non-serious adverse events: 5 %

| Non-serious adverse events | Placebo | Genz--112638 | |
|---|------------------|------------------|--|
| Total subjects affected by non-serious adverse events | | | |
| subjects affected / exposed | 14 / 20 (70.00%) | 17 / 20 (85.00%) | |
| General disorders and administration site conditions | | | |
| Asthenia | | | |
| subjects affected / exposed | 1 / 20 (5.00%) | 3 / 20 (15.00%) | |
| occurrences (all) | 1 | 3 | |
| Fatigue | | | |

| | | | |
|---|----------------------|----------------------|--|
| subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 2 / 20 (10.00%) 2 | |
| Oedema Peripheral subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Pyrexia subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 2 / 20 (10.00%) 2 | |
| Immune system disorders Seasonal Allergy subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 1 / 20 (5.00%) 1 | |
| Reproductive system and breast disorders Dysmenorrhoea subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Respiratory, thoracic and mediastinal disorders Cough subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Epistaxis subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Nasal Congestion subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Nasal Obstruction subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Oropharyngeal Pain subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Rhinorrhoea subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Psychiatric disorders | | | |

| | | | |
|---|----------------------|------------------------|--|
| Anxiety subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 2 / 20 (10.00%) 2 | |
| Investigations Blood Creatine Phosphokinase Increased subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 1 / 20 (5.00%) 1 | |
| Bone Density Decreased subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 0 / 20 (0.00%) 0 | |
| Injury, poisoning and procedural complications Contusion subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Ligament Sprain subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 0 / 20 (0.00%) 0 | |
| Thermal Burn subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 0 / 20 (0.00%) 0 | |
| Cardiac disorders Palpitations subjects affected / exposed occurrences (all) | 3 / 20 (15.00%) 3 | 0 / 20 (0.00%) 0 | |
| Nervous system disorders Dizziness subjects affected / exposed occurrences (all) | 3 / 20 (15.00%) 3 | 1 / 20 (5.00%) 1 | |
| Headache subjects affected / exposed occurrences (all) | 7 / 20 (35.00%) 7 | 11 / 20 (55.00%) 11 | |
| Migraine subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 3 / 20 (15.00%) 3 | |
| Blood and lymphatic system disorders | | | |

| | | | |
|--|----------------------|----------------------|--|
| Iron Deficiency Anaemia subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Eye disorders Eye Irritation subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Gastrointestinal disorders Abdominal Distension subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 3 / 20 (15.00%) 3 | |
| Abdominal Pain subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 4 / 20 (20.00%) 4 | |
| Abdominal Pain Upper subjects affected / exposed occurrences (all) | 4 / 20 (20.00%) 4 | 1 / 20 (5.00%) 1 | |
| Diarrhoea subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 5 / 20 (25.00%) 5 | |
| Dry Mouth subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 0 / 20 (0.00%) 0 | |
| Dyspepsia subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 4 / 20 (20.00%) 4 | |
| Gastritis subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Gastrooesophageal Reflux Disease subjects affected / exposed occurrences (all) | 4 / 20 (20.00%) 4 | 1 / 20 (5.00%) 1 | |
| Nausea subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 3 / 20 (15.00%) 3 | |
| Toothache | | | |

| | | | |
|---|----------------------|------------------------|--|
| subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Vomiting subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 1 / 20 (5.00%) 1 | |
| Skin and subcutaneous tissue disorders | | | |
| Acne subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Alopecia subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Rash subjects affected / exposed occurrences (all) | 3 / 20 (15.00%) 3 | 0 / 20 (0.00%) 0 | |
| Skin Lesion subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 1 / 20 (5.00%) 1 | |
| Renal and urinary disorders | | | |
| Proteinuria subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Musculoskeletal and connective tissue disorders | | | |
| Arthralgia subjects affected / exposed occurrences (all) | 4 / 20 (20.00%) 4 | 11 / 20 (55.00%) 11 | |
| Back Pain subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 5 / 20 (25.00%) 5 | |
| Bone Pain subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 2 / 20 (10.00%) 2 | |
| Joint Stiffness subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Musculoskeletal Pain | | | |

| | | | |
|---|----------------------|----------------------|--|
| subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 1 / 20 (5.00%) 1 | |
| Myalgia subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Pain In Extremity subjects affected / exposed occurrences (all) | 4 / 20 (20.00%) 4 | 4 / 20 (20.00%) 4 | |
| Infections and infestations | | | |
| Bronchitis subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Gastroenteritis subjects affected / exposed occurrences (all) | 3 / 20 (15.00%) 3 | 1 / 20 (5.00%) 1 | |
| Hordeolum subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 0 / 20 (0.00%) 0 | |
| Nasopharyngitis subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 5 / 20 (25.00%) 5 | |
| Otitis Media subjects affected / exposed occurrences (all) | 0 / 20 (0.00%) 0 | 2 / 20 (10.00%) 2 | |
| Sinusitis subjects affected / exposed occurrences (all) | 2 / 20 (10.00%) 2 | 3 / 20 (15.00%) 3 | |
| Tonsillitis subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |
| Upper Respiratory Tract Infection subjects affected / exposed occurrences (all) | 3 / 20 (15.00%) 3 | 4 / 20 (20.00%) 4 | |
| Urinary Tract Infection subjects affected / exposed occurrences (all) | 1 / 20 (5.00%) 1 | 2 / 20 (10.00%) 2 | |

More information

Substantial protocol amendments (globally)

Were there any global substantial amendments to the protocol? Yes

| Date | Amendment |
|------------------|--|
| 21 May 2009 | <ul style="list-style-type: none">- Changes to study eligibility: pregnancy test results and use of medications known to inhibit CYP2D6 were to be evaluated prior to randomisation, and not prior to dosing; pathological bone involvement was to be evaluated in consultation with the central bone reviewer; acid glucosidase activity was to be evaluated in leukocytes, and not whole blood; documentation of anemia due to causes other than GD1 was to be based on folate, iron, and vitamin B-12 only, and not RBC.- A T2-weighted MRI of the femur was to be obtained, and not short T1 inversion recovery (STIR). Bone disease assessments were also added to the safety endpoints and safety analyses for completeness. |
| 25 February 2010 | <ul style="list-style-type: none">- Listed duration of each subjects in study. Updated risk/benefit & dose rationale information. Extension in screening period. Opened enrollment of broader subject population, including subjects who were >65 years of age, had received ERT more recently or had a prior history of cancer.- Removed contraception requirement for male subjects & allowed use of certain hormonal contraceptives in female subjects.- Modified restriction of CYP2D6 inhibitors use, temporary use of CYP3A4 inducers & strong inhibitors of CYP2D6 & CYP3A4 after completion of dose adjustment in each treatment period & exception for chronic medications after completion of dose adjustment in LTTP. Outlined specific actions were taken during temporary use based on type of concomitant medication, subject's CYP2D6 phenotype & treatment period.- Added second dose adjustment to 150 mg BID LTTP for subjects not achieved target trough conc. >5 ng/mL.- Added serial PK sampling after second dose adjustment, with 24-hour sampling for subjects receiving 150 mg BID.-Reduced PK sampling after single 50-mg dose on Day 1 & during study periods when subjects had received 50 mg BID or 100 mg BID.-Added and updated PK sampling in concomitant medications that had potential to alter Genz-112638 exposure based on revised PK sampling scheme.-Moved Wk 43 clinical laboratory tests & ECGs to Wk 45 & Wk 47, to better align with timing of second dose adjustment.-Added optional blood collection for pharmacogenetics analyses, to permit evaluation of emerging clinical issues.-Added GM3 as an exploratory marker to confirm lack of inhibition of the GL-1 pathway. Revised time points for biomarkers & exploratory biomarkers to reduce total number of measurements.-Added measurement of spleen & liver volume of subjects withdrew prior Week 26 & missing data was handled for subjects withdrew prior to Week 39.-Changed AE causality assessment as per National Cancer Institute Common Toxicology Criteria for Adverse Events. |

| | |
|------------------|--|
| 10 November 2010 | <ul style="list-style-type: none"> - Planned enrollment was reduced from 36 subjects to 28 subjects. Underlying sample size assumptions were unchanged, and study remained adequately powered for primary efficacy endpoint (85% power for 28 subjects compared with a previous estimate of 92% power for 36 subjects) and all secondary endpoints. - Broadened target subject population to included following subjects, as data from the Phase 2 study (GZGD00304) and/or Gaucher Registry (for subjects on Cerezyme) suggested that such subjects might benefit from eliglustat therapy: Spleen volume as low as 6 MN (previously 8 MN) Platelet count as high as 130,000/mm³ (previously 100,000/mm³) - Radiological evidence of bone involvement in the absence of clinical symptoms (previously any documented bone involvement was an exclusion) - The analysis of organ volume measurements in subjects who had a repeat measurement (due to a >30% increase in volume on the original measurement) was modified such that only the repeat measurement was to be used in statistical analyses, rather than the average of the original and repeat measurements. This change was made because the original >30% increase in organ volume could potentially be due to a transient condition unrelated to Gaucher disease or treatment response. - Study visits in the LTTP were scheduled relative to the start of that study period, and not relative to the start of the Primary Analysis Period, given the duration of time required to complete specified assessments between study periods. - A PK sample was to be obtained at the Early Withdrawal visit only for subjects who withdrew due to an AE. |
| 12 July 2011 | <ul style="list-style-type: none"> - The principal change was the implementation of additional monitoring in subjects with a peak plasma concentration ≥ 150 ng/mL. In such subjects, the dose of eliglustat was to be temporarily interrupted while the subject returned to the site for further evaluations. The nature of these evaluations and any subsequent dose modifications were dependent on the subject's observed peak plasma concentration and the treatment period in which it occurred, any concurrent safety findings, and the feasibility of adjusting any concomitant medications. Management of subjects with peak plasma concentrations ≥ 150 ng/mL. - Added 2-hour post-dose PK sampling at additional study visits. - Added a secondary analysis of within-subject changes in spleen volume, hemoglobin, liver volume, and platelet count for all randomised subjects with 39 weeks of treatment on eliglustat in the Primary Analysis Period (eliglustat group) or LTTP (placebo group). - Added an exception for temporary use of medications known to prolong QTc interval, after completion of the dose adjustment in either treatment period. - Clarified that, for the purpose of concomitant medication management, CYP2D6 indeterminate metabolizers would be considered poor metabolizers if neither allele was known to be active and non-poor metabolizer if 1 allele was known to be active. - Expanded the definition of MEOIs to include syncope from any cause, and not just syncope that may be a result of arrhythmia. Clarified that MEOIs occurring prior to initiation of study treatment were not required to be reported. - Clarified which assessments were required to be repeated during re-screening. |

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|------------------|--|
| 27 March 2012 | <ul style="list-style-type: none"> - Sample size, which had been adjusted downward to 28 subjects, was reverted to 36 subjects. - Extended the total study duration (due to the delay in enrollment). - Added an exploratory analysis of bone biomarkers (to investigate the role of impaired bone formation vs. accelerated bone resorption in the pathophysiology of Gaucher-related osteopenia and the mechanism of eliglustat effects on bone). - Updated / clarified concomitant medication guidance: - Added a definition of concomitant medications. - Added requirements to (1) notify the Sponsor's Medical Monitor in the event of temporary use of a CYP3A4 inducer and (2) interrupt the dose of eliglustat during temporary use of strong inhibitors of CYP2D6 or CYP3A4. - Added a statement about the potential for eliglustat to increase the exposure of P gp substrate drugs. - Clarified that the only subjects who should be on chronic therapy when entering the Long-term Treatment Period are CYP2D6 non-poor metabolizers, and that chronic therapy in these subjects is limited to a strong inhibitor of CYP2D6 or CYP3A4 (but not both). - Clarified that PK samples would be collected only in the event of changes in chronic use (not temporary use) of strong inhibitors of CYP2D6 or CYP3A4 or inducers of CYP3A4, and further clarified that discontinuation of a chronic medication would necessitate such PK sampling. - Added annual neurological examinations from Week 78 through the end of study, to allow detection of clinical signs or symptoms suggestive of nerve conduction abnormalities during LTTP. - Reduced the frequency of ECGs to every 6 months (previously every 3 months) during the Long-term Treatment Period, as this is deemed sufficient to monitor cardiac safety and will reduce the burden on subjects. - Updated risk/benefit information based on recently completed clinical studies. |
| 05 February 2013 | <ul style="list-style-type: none"> - Updated concomitant medication guidance as based on the information provided in the investigator letter. |

Notes:

Interruptions (globally)

Were there any global interruptions to the trial? No

Limitations and caveats

None reported

Online references

<http://www.ncbi.nlm.nih.gov/pubmed/9605861>