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Effect of linagliptin on daily glucose excursion in continuous glucose monitoring of Japanese type 2 diabetic patients

Submission date
18/03/2017

Recruitment status
No longer recruiting

Registration date
23/03/2017

Overall study status
Completed

Last Edited
18/02/2022

Condition category
Nutritional, Metabolic, Endocrine

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Diabetes is a life-long condition where a person is unable to control their blood sugar levels. Type 2 diabetes is a type of diabetes that usually occurs later in life and happens when the pancreas does not produce enough insulin (a hormone) or the body does not react to insulin as it is supposed to. It can be caused by certain risk factors such as weight, age, and genetics. Controlling glucose (sugar levels) is very important to prevent complications as fluctuating glucose levels induce stress and this may increase the risk of heart complications. Previous research has shown that daily glucose levels should be controlled especially in order to prevent heart issues. There are certain medications that can assist in controlling glucose such as linagliptin (increases the amount of insulin that the body produces) or voglibose (lowers blood sugar levels by delaying the absorption of glucose in the blood). Using continuous glucose monitoring, people are now able to check their blood sugar levels in real time, which helps measure their glucose levels. GCM is a small device that is worn under the skin that senses blood glucose levels, allowing the wearer to track their levels throughout the day. This can help people control their daily changes which may minimize heart issues in patients with diabetes in the future. This study aims to compare the effects of linagliptin and voglibose on daily glucose excursion in Japanese patients with type 2 diabetes using continuous glucose monitoring (CGM).

Who can participate?
Adults aged 20 or older who have diabetes.

What does the study involve?
Participants undergo two CGM evaluations at the beginning of the treatment and at the end of the treatment. They receive three standardized meals (breakfast, lunch and dinner) on the third day of their CGM evaluation. After this, participants are randomly allocated to one of two groups. Those in the first group take linagliptin (5 milligrams per day) by mouth. Those in the second group take voglibose (0.6 milligram per day) by mouth three times daily (with their meals) for 12 weeks. Participants are evaluated at the end of the treatment to see if there are any changes in their glucose levels.

What are the possible benefits and risks of participating?
Participants may benefit from obtaining their daily glucose levels by using the CGM. There are no notable risks with participating.

Where is the study run from?
This study is being run from Fukushima Medical University (Japan) and takes place in 14 hospitals /clinics in Japan.

When is the study starting and how long is it expected to run for?
February 2013 to March 2017.

Who is funding the study?
Nippon Boehringer Ingelheim Co. Ltd. (Japan)

Who is the main contact?
Dr Hiroaki Satoh
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
UMIN000010880

Study information

Scientific Title
Linagliptin versus voglibose on glucose excursion in japanese patients with type 2 diabetes mellitus: effect of linagliptin on daily glucose excursion in continuous glucose monitoring of Japanese type 2 diabetic patients (L-CGM study): a 12-week randomized, open-label, 2-arm parallel comparative trial

Acronym
L-CGM

Study objectives
Linagliptin is superior to voglibose in reducing glucose excursions in patients with type 2 diabetes.

Ethics approval required
Old ethics approval format

Ethics approval(s)
The Fukushima Medical University Institutional Review Board, 27/05/2013, ref: No. 1682

Study design
Multi-center randomised open-label two-arm parallel comparative trial

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Type 2 diabetes

Interventions
Participants are randomly allocated to one of two groups using a dynamic allocation method based on baseline measurements of HbA1c and BMI. Participants undergo Continuous Glucose Monitorin (CGM) evaluation using an iPro2 device (Medtronic Minimed, Northridge, CA, USA) for two three-day periods at baseline and 12 weeks. Data is collected in blinded fashion and analysed centrally. During the third day of CGM periods, three standardised meals (breakfast, lunch and dinner) are delivered to each subject. Patients unable to consume a standardised meal for lunch (i.e. due to work restrictions, travel or unexpected events) consumed a calorie-restricted meal (1,800 kcal/day, 60% carbohydrates, 25% fat and 15% protein) equivalent to a standardised meal.

Participants then take the medication according to the group they are allocated to. Those in group one take linagliptin (5 mg/day) orally according to the treatments group assignment for 12 weeks. Those in group two take vogibose (0.2 mg/meal) orally three times a day with each meal according to treatments group assignment for 12 weeks.

Participants are followed up at the end of the 12 weeks to evaluate changes in mean 24-hour glucose levels, mean amplitude of glycemic excursion (MAGE), and standard deviation of the mean 24-hour CGM blood glucose reading.

Intervention Type
Drug

Drug/device/biological/vaccine name(s)
Linagliptin

Primary outcome(s)
1. Mean 24 hour glucose level is measured using blood samples at baseline and 12 weeks
2. Mean amplitude of glycemic excursion (MAGE) is measured using blood samples at baseline and 12 weeks
3. Standard deviation of mean 24-hour CGM blood glucose readings are measured using blood samples at baseline and 12 weeks

Key secondary outcome(s))
1. HbA1c is measured using blood samples at baseline and 12 weeks
2. Levels of glycoalbumin (GA) are measured using blood samples at baseline and 12 weeks
3. 1,5-anhydroglucitol (1,5-AG) are measured using bloo samples at baseline and 12 weeks
4. Homeostatic model assessment (HOMA)-IR measured using blood samples at baseline and 12 weeks
5. HOMA-β is measured using blood samples at baseline and 12 weeks
6. Insulin is measured using blood samples at baseline and 12 weeks
7. C-peptide is measured using blood samples at baseline and 12 weeks
8. Glucagon is measured using blood samples at baseline and 12 weeks
9. Adiponectin is measured using blood samples at baseline and 12 weeks
10. Resistin is measured using blood samples at baseline and 12 weeks
11. tumor necrosis factor (TNF)-α is measured using blood samples at baseline and 12 weeks
12. Lipid parameters (including triglycerides (TG), total cholesterol (TC), high-density lipoprotein (HDL)-C, low-density lipoprotein (LDL)-C, and free fatty acids (FFA)) are measured using blood samples at baseline and 12 weeks
13. Regimen safety is measured using blood samples at baseline and 12 weeks

Completion date
01/03/2017

Eligibility

Key inclusion criteria
1. Type 2 diabetes
2. No treatment with any anti-diabetes drugs within 12 weeks
3. HbA1c of 6.5%–10.0%
4. Body mass index (BMI) of 18.5–34.9 kg/m2
5. Estimated glomerular filtration rate (eGFR) ≥45 mL/min/m2
6. Aged 20 years or older

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
All

Key exclusion criteria
1. Type 1 or secondary diabetes
2. Presence of severe preoperative- or postoperative infectious disease or severe trauma
3. History of myocardial infarction, angina pectoris, cerebral stroke, or cerebral infarction within the previous 3 months;
4. Moderate or severe heart failure (New York Heart Association stage III or higher)
5. Severe liver dysfunction (aspartate aminotransferase (AST), aspartate transaminase (ALT) or alkaline phosphatase (ALP) exceeding three times the upper limit of normal)
6. History of allergy or hypersensitivity to any drug
7. Alcohol abuse or drug dependence
8. Pregnancy or possible pregnancy, lactation, or intent to become pregnant during the study period;
9. History of cancer, open abdominal surgery, or ileus
10. Oral or intravenous corticosteroid therapy
11. Determination of ineligibility by clinical investigators

Date of first enrolment
01/07/2013

Date of final enrolment
24/10/2013

Locations

Countries of recruitment
Japan

Study participating centre
Fukushima Medical University
1 Hikarigaoka Fukushima-City
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Japan
960-1295

Study participating centre
Fukushima Seibu Hospital
3-15 Higashichuo Fukushima-City
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Japan
960-8071

Study participating centre

Iwaki Kyoritsu General Hospital
16 Kusehara Uchigomimayamachi Iwaki-City
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Study participating centre
Japanese Red Cross Medical Center
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Shibuya-ku Tokyo
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Study participating centre
Kansai Rosai Hospital
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660-8511

Study participating centre
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20-6 Okamae Date-City
Fukushima
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960-0418

Study participating centre
Misaki Naika Clinic
6-44-9 Miwahigashi Funabashi-City
Chiba
Japan
273-8501

Study participating centre
Nishimura Clinic
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116-0012

Study participating centre
Ohara General Hospital
6-1-1 Omachi Fukushima-City
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Study participating centre
Seino Internal Medicine Clinic
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Fukushima
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963-8851

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Shirakawa Kosei Hospital
2-1 Toyochikamiyajiro Shirakawa-City
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961-0005

Study participating centre
Soma Central Hospital
3-5-18 Okinouchi Soma-City
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976-0016

Study participating centre

Taneda Clinic
3-82-2 Uchigomimayamachi Iwaki-City
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973-8402

Study participating centre
Tokyo Metropolitan Tama Medical Center
2-8-29 Musashidai Fuchu-City
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Sponsor information

Organisation
Japan Society for Patient Reported Outcome

Funder(s)

Funder type
Industry

Funder Name
Nippon Boehringer Ingelheim Co. Ltd.

Funder Name
Eli Lilly and Company

Alternative Name(s)
Lilly, Eli Lilly & Company, Eli Lilly & Co., Eli Lilly And Co, Eli Lilly & Co

Funding Body Type
Government organisation

Funding Body Subtype
For-profit companies (industry)

Location
United States of America

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request from Dr Hiroaki Satoh hk-sato@juntendo.ac.jp

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		01/12/2017	18/02/2022	Yes	No