



## Clinical trial results:

### Evaluation of the Effect of Glucagon Solutions on the Glucose Concentration at the Subcutaneous Administration Site in Type 1 Diabetic Patients.

#### Summary

EudraCT number	2014-002341-22
Trial protocol	AT
Global end of trial date	13 November 2015

#### Results information

Result version number	v1 (current)
This version publication date	06 December 2024
First version publication date	06 December 2024

#### Trial information

##### Trial identification

Sponsor protocol code	GLINOX-01
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##### Additional study identifiers

ISRCTN number	-
ClinicalTrials.gov id (NCT number)	-
WHO universal trial number (UTN)	-

Notes:

##### Sponsors

Sponsor organisation name	Medical University of Graz
Sponsor organisation address	Auenbruggerplatz 15, Graz, Austria, A-8036
Public contact	Center for Medical Research (ZMF), Dept. of Internal Medicine; Division of Endocrinology and Diabetology, +43 31638572831, werner.regittnig@medunigraz.at
Scientific contact	Center for Medical Research (ZMF), Dept. of Internal Medicine; Division of Endocrinology and Diabetology, +43 31638572831, werner.regittnig@medunigraz.at

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?	No

Notes:

## Results analysis stage

Analysis stage	Final
Date of interim/final analysis	13 November 2015
Is this the analysis of the primary completion data?	Yes
Primary completion date	13 November 2015
Global end of trial reached?	Yes
Global end of trial date	13 November 2015
Was the trial ended prematurely?	No

Notes:

## General information about the trial

Main objective of the trial:

The main objective of this study is to ascertain in humans whether commercially available glucagon solutions affect the glucose concentration in the interstitial fluid (ISF) at the subcutaneous infusion site.

Protection of trial subjects:

Number of intravenous and subcutaneous catheters inserted as well as the number of blood samples drawn during the study visit were minimised to minimise distress and pain.

Background therapy: -

Evidence for comparator: -

Actual start date of recruitment	24 July 2014
Long term follow-up planned	No
Independent data monitoring committee (IDMC) involvement?	No

Notes:

## Population of trial subjects

### Subjects enrolled per country

Country: Number of subjects enrolled	Austria: 10
Worldwide total number of subjects	10
EEA total number of subjects	10

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)	0
Adults (18-64 years)	10
From 65 to 84 years	0
85 years and over	0

## Subject disposition

### Recruitment

Recruitment details:

Patients were recruited from the diabetes out-patient clinics of the Medical University of Graz.  
Recruitment period lasted from July 2014 to September 2014.

### Pre-assignment

Screening details:

11 subjects were screened. They were male, age group of 18–65 years and diagnosed with T1D. They had to have HbA1C of <10%, body mass index between 20 and 30 kg/m<sup>2</sup> and had to be treated with multiple daily injections or continuous subcutaneous insulin Infusion (insulin pump therapy). 1 subject has withdrawn consent before study enrollment.

### Period 1

Period 1 title	Overall Study (overall period)
Is this the baseline period?	Yes
Allocation method	Not applicable
Blinding used	Not blinded

### Arms

<b>Arm title</b>	Glucagon Infusion Period
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Arm description:

Subjects wore four microperfusion (MP) catheters over a period of 13 hours. Two of the MP catheters were perfused with glucagon solutions from Novo Nordisk (1 mg/ml, GlucaGen) and Eli Lilly (1 mg/ml, Eli Lilly Glucagon) to allow glucagon delivery and simultaneous interstitial fluid (ISF) sampling over a period of 6 hours. For comparison purposes, the two MP catheters were perfused with an isotonic solution (5%-mannitol) before the glucagon delivery period (basal period lasting 4.5 hours) and after the glucagon delivery period (lasting 2 hours).

Arm type	Experimental
Investigational medicinal product name	GlucaGen and Eli Lilly Glucagon
Investigational medicinal product code	SUB02349MIG and SUB02347MIG
Other name	Glucagons from NovoNordisk and Eli Lilly
Pharmaceutical forms	Solution for injection/infusion
Routes of administration	Subcutaneous use

Dosage and administration details:

The total amount of glucagon delivered via the two MP catheters over the 6-hour perfusion period was 0.44 mg.

<b>Number of subjects in period 1</b>	Glucagon Infusion Period
Started	10
Completed	10

## Baseline characteristics

### Reporting groups

Reporting group title	Overall Study (overall period)
Reporting group description: The reporting group data set includes the ratio between the ISF and plasma glucose concentration observed during the glucagon infusion periods.	

Reporting group values	Overall Study (overall period)	Total	
Number of subjects	10	10	
Age categorical Units: Subjects			
In utero	0	0	
Preterm newborn infants (gestational age < 37 wks)	0	0	
Newborns (0-27 days)	0	0	
Infants and toddlers (28 days-23 months)	0	0	
Children (2-11 years)	0	0	
Adolescents (12-17 years)	0	0	
Adults (18-64 years)	10	10	
From 65-84 years	0	0	
85 years and over	0	0	
Age continuous Units: years			
arithmetic mean	41.2		
standard deviation	± 11.4	-	
Gender categorical Units: Subjects			
Female	0	0	
Male	10	10	

### Subject analysis sets

Subject analysis set title	Basal Period
Subject analysis set type	Full analysis
Subject analysis set description: The subject analysis data set includes the ratio between the ISF and plasma glucose concentration observed during the basal periods.	

Reporting group values	Basal Period		
Number of subjects	10		
Age categorical Units: Subjects			
In utero	0		
Preterm newborn infants (gestational age < 37 wks)	0		
Newborns (0-27 days)	0		
Infants and toddlers (28 days-23 months)	0		

Children (2-11 years)	0		
Adolescents (12-17 years)	0		
Adults (18-64 years)	10		
From 65-84 years	0		
85 years and over	0		
Age continuous			
Units: years			
arithmetic mean			
standard deviation	±		
Gender categorical			
Units: Subjects			
Female	0		
Male	10		

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## End points

### End points reporting groups

Reporting group title	Glucagon Infusion Period
Reporting group description: Subjects wore four microperfusion (MP) catheters over a period of 13 hours. Two of the MP catheters were perfused with glucagon solutions from Novo Nordisk (1 mg/ml, GlucaGen) and Eli Lilly (1 mg/ml, Eli Lilly Glucagon) to allow glucagon delivery and simultaneous interstitial fluid (ISF) sampling over a period of 6 hours. For comparison purposes, the two MP catheters were perfused with an isotonic solution (5%-mannitol) before the glucagon delivery period (basal period lasting 4.5 hours) and after the glucagon delivery period (lasting 2 hours).	
Subject analysis set title	Basal Period
Subject analysis set type	Full analysis
Subject analysis set description: The subject analysis data set includes the ratio between the ISF and plasma glucose concentration observed during the basal periods.	

### Primary: ISF-To-Plasma Glucose Concentration Ratio During GlucaGen Infusion Period

End point title	ISF-To-Plasma Glucose Concentration Ratio During GlucaGen Infusion Period
End point description:	
End point type	Primary
End point timeframe: Ratio between the ISF and plasma glucose concentration observed during the basal period and the Glucagen infusion period.	

End point values	Glucagon Infusion Period	Basal Period		
Subject group type	Reporting group	Subject analysis set		
Number of subjects analysed	10	10		
Units: %				
arithmetic mean (standard error)	83.79 (± 1.97)	71.61 (± 3.23)		

### Statistical analyses

Statistical analysis title	ISF-To-Plasma Ratio - GlucaGen Infusion vs Basal
Comparison groups	Glucagon Infusion Period v Basal Period
Number of subjects included in analysis	20
Analysis specification	Pre-specified
Analysis type	other
P-value	< 0.01
Method	t-test, 2-sided

## Secondary: Glucagon Infusion Period vs Basal Period

End point title	Glucagon Infusion Period vs Basal Period
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End point description:

End point type	Secondary
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End point timeframe:

Ratio between the ISF and plasma glucose concentration observed during the basal period and the Eli Lilly Glucagon infusion period.

End point values	Glucagon Infusion Period	Basal Period		
Subject group type	Reporting group	Subject analysis set		
Number of subjects analysed	10	10		
Units: %				
arithmetic mean (standard error)	89.22 ( $\pm$ 2.39)	68.45 ( $\pm$ 4.11)		

## Statistical analyses

Statistical analysis title	ISF-To-Plasma Ratio - Eli Lilly Infusion vs Basal
Comparison groups	Glucagon Infusion Period v Basal Period
Number of subjects included in analysis	20
Analysis specification	Pre-specified
Analysis type	other
P-value	< 0.01
Method	t-test, 2-sided

## Adverse events

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### Adverse events information<sup>[1]</sup>

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Timeframe for reporting adverse events:

Adverse events were assessed during the whole study duration.

Assessment type	Systematic
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### Dictionary used

Dictionary name	MedDRA
Dictionary version	18

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

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Notes:

[1] - There are no non-serious adverse events recorded for these results. It is expected that there will be at least one non-serious adverse event reported.

Justification: No non-serious adverse events occurred during this study.



**More information**

**Substantial protocol amendments (globally)**

Were there any global substantial amendments to the protocol? Yes

Date	Amendment
14 July 2014	Inclusion of the use of an alternative tissue catheter type.

Notes:

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**Interruptions (globally)**

Were there any global interruptions to the trial? No

**Limitations and caveats**

None reported