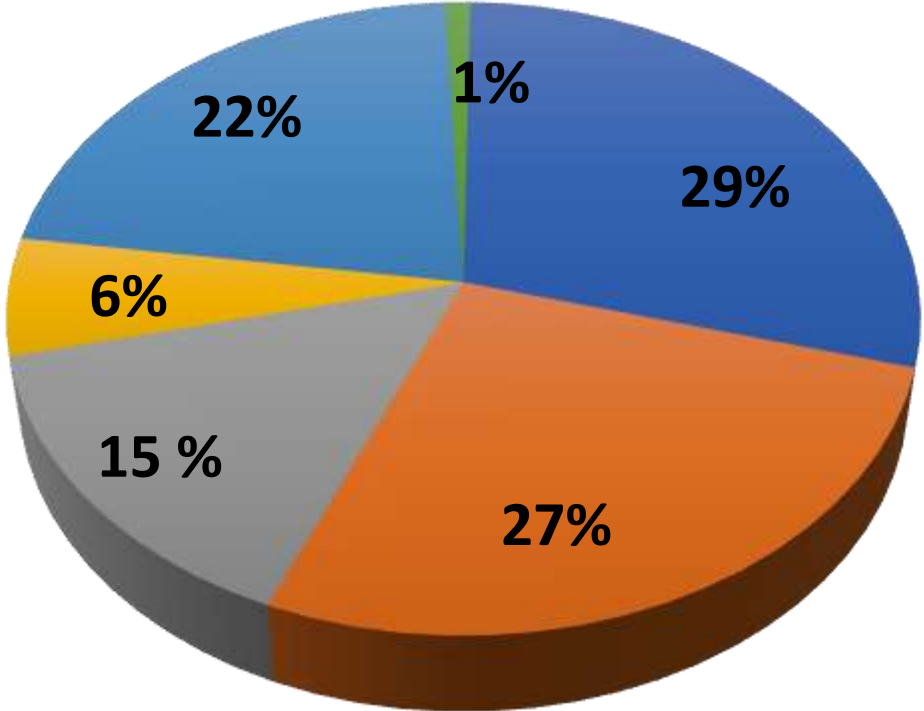# LONG-TERM EFFECTS OF BARIATRIC SURGERY VS STANDARD CARE ON INSULIN SECRETION AND INSULIN SENSITIVITY

Rami Archid , Karin Zhou , Louise Fritsche , Robert Wagner
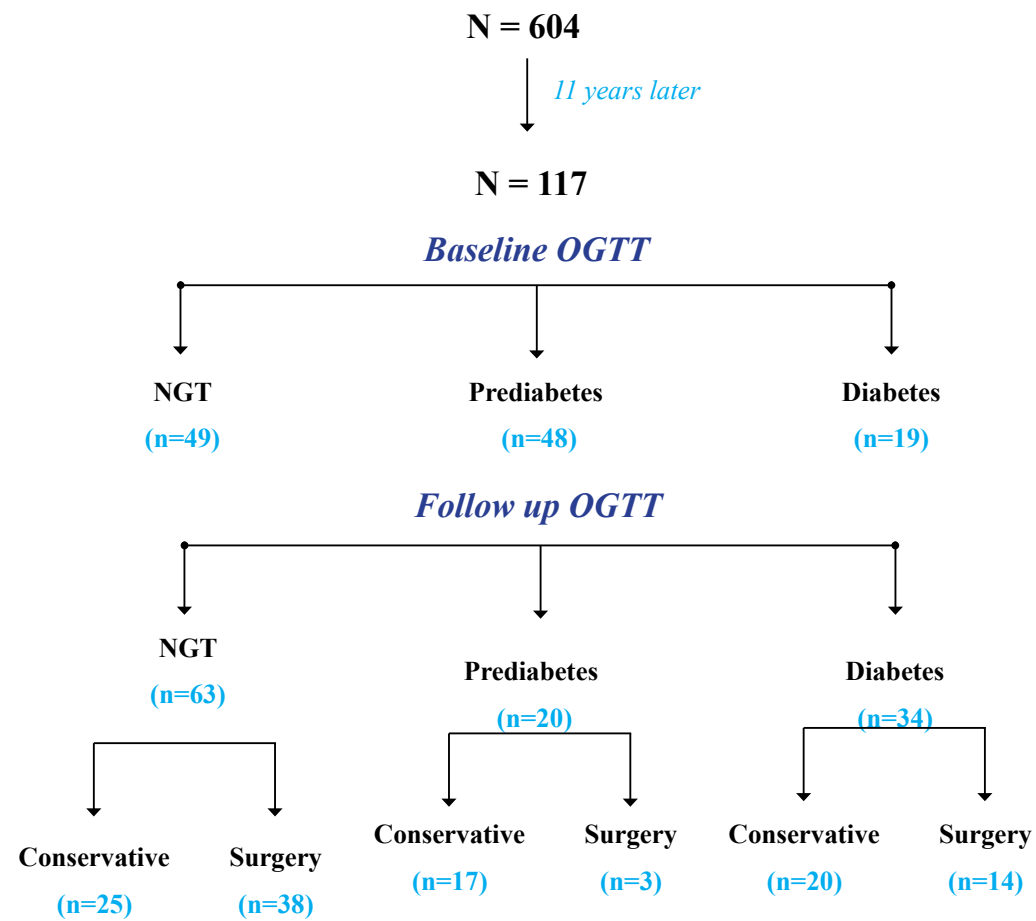University Hospital of Tuebingen, Germany

IFSO

NAPOLI
2023

I have no potential conflict of interest to report

N = 604

11 years later

N = 117

Baseline OGTT

NGT	Prediabetes	Diabetes
(n=49)	**(n=48)**	**(n=19)**

Follow up OGTT

NGT
(n=63)

Prediabetes
(n=20)

Diabetes
(n=34)

Conservative	Surgery	Conservative	Surgery	Conservative	Surgery
(n=25)	**(n=38)**	**(n=17)**	**(n=3)**	**(n=20)**	**(n=14)**

SG = 42
RYGB = 13
Conservative 62

Primary Endpoint:

Relationship between type of intervention (conservative therapy, sleeve gastrectomy, or Roux-en-Y gastric bypass) and BMI, insulin sensitivity, and insulin secretion.

Secondary Endpoint:

Impact of baseline insulin sensitivity and type of intervention on the prevalence of Type 2 Diabetes.

Results

- Long term effects of type of intervention on BMI

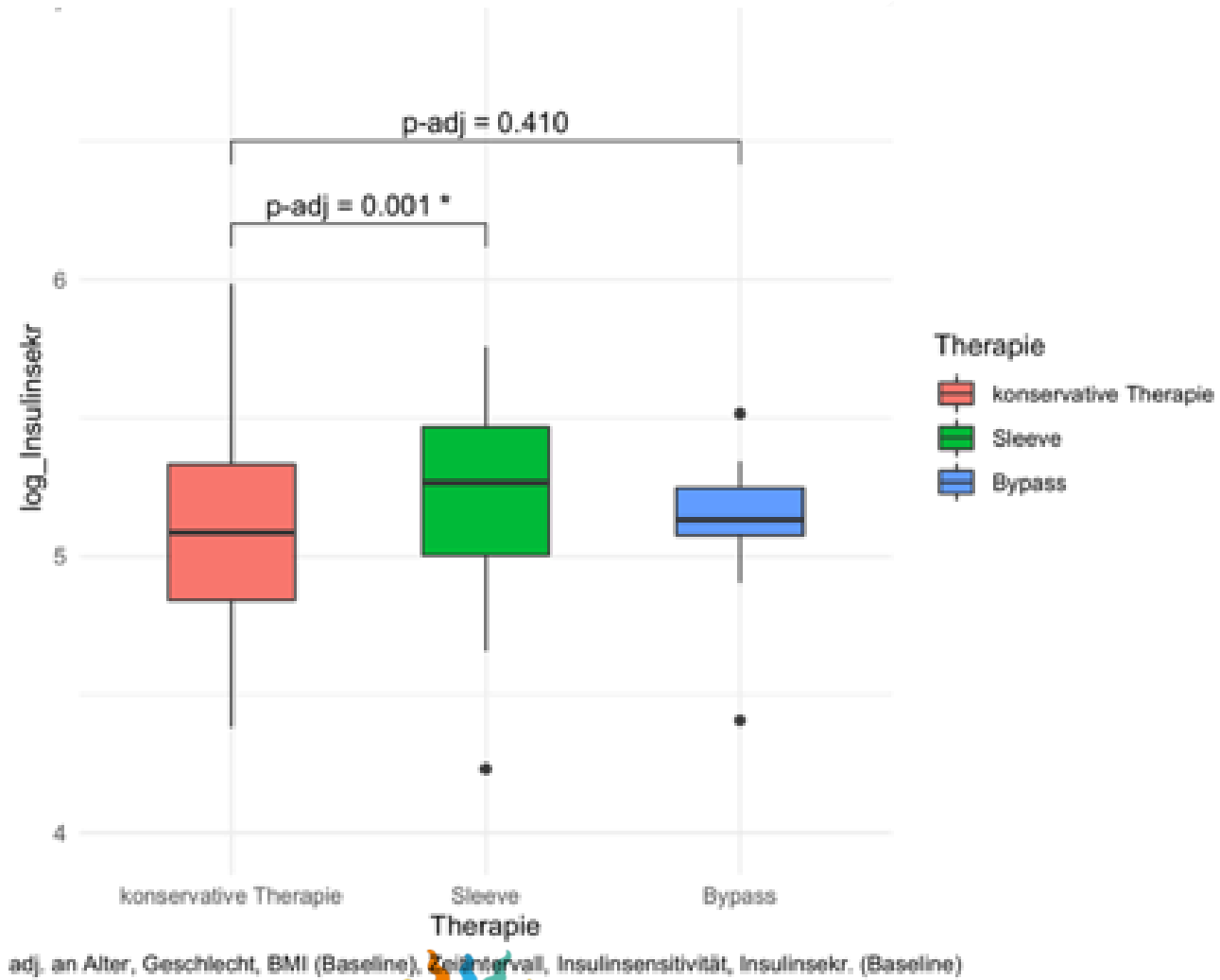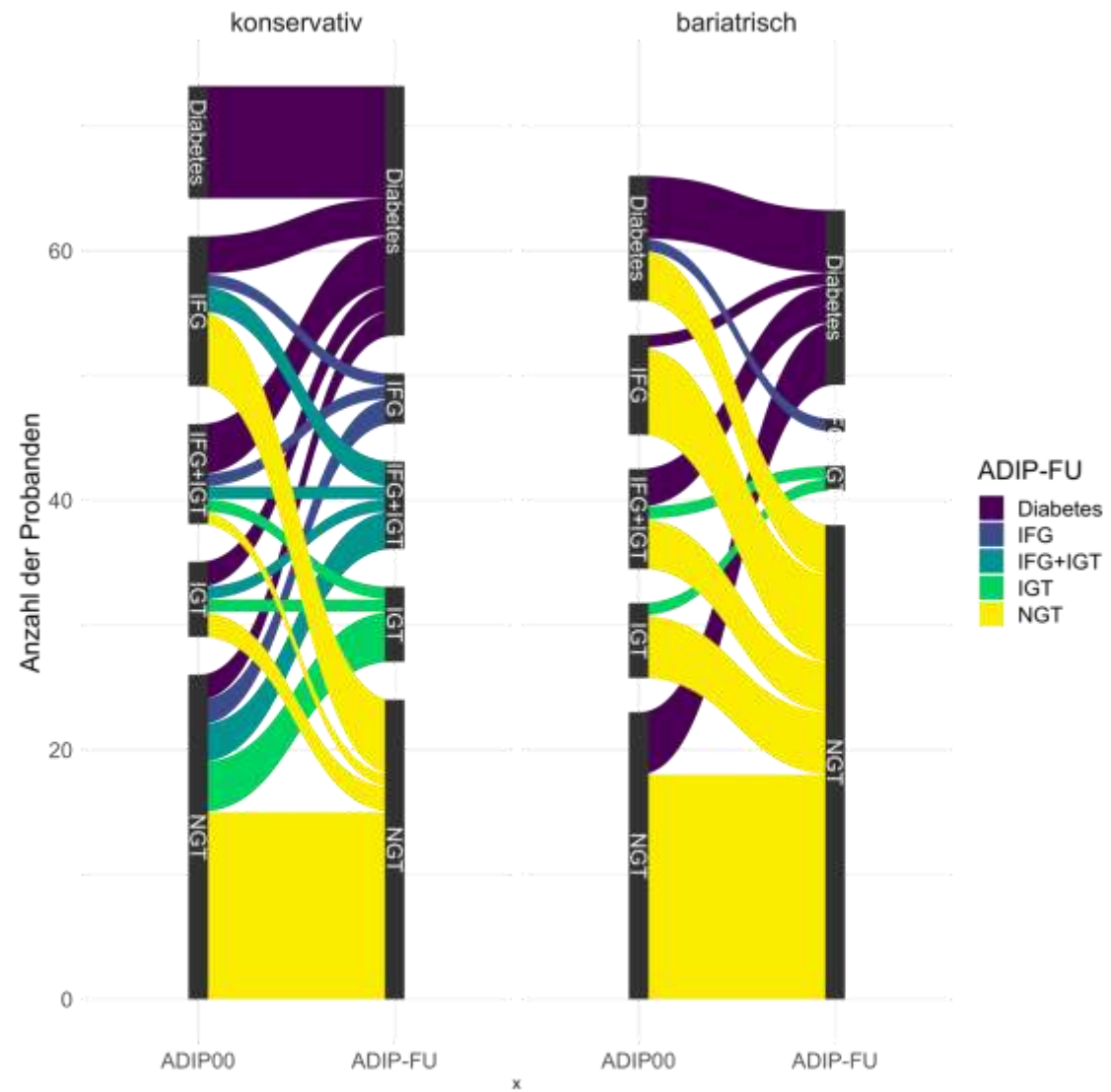| Predictors	BMI		
	Estimates	*CI*	*p*
(Intercept)	-101.51	-129.91 – -73.11	**<0.001**
Age	-0.05	-0.16 – 0.05	0.315
BMI (Baseline)	34.55	27.67 – 41.43	**<0.001**
Sex [M]	1.91	-0.83 – 4.66	0.170
Follow-Up time period	7.29	2.38 – 12.21	**0.004**
Treatment [Sleeve]*	-8.11	-10.71 – -5.51	**<0.001**
Treatment [Bypass]*	-10.00	-13.83 – -6.16	**<0.001**
Observations	115		
R² / R² adjusted	0.517 / 0.490		

Long term effects of type of intervention on BMI
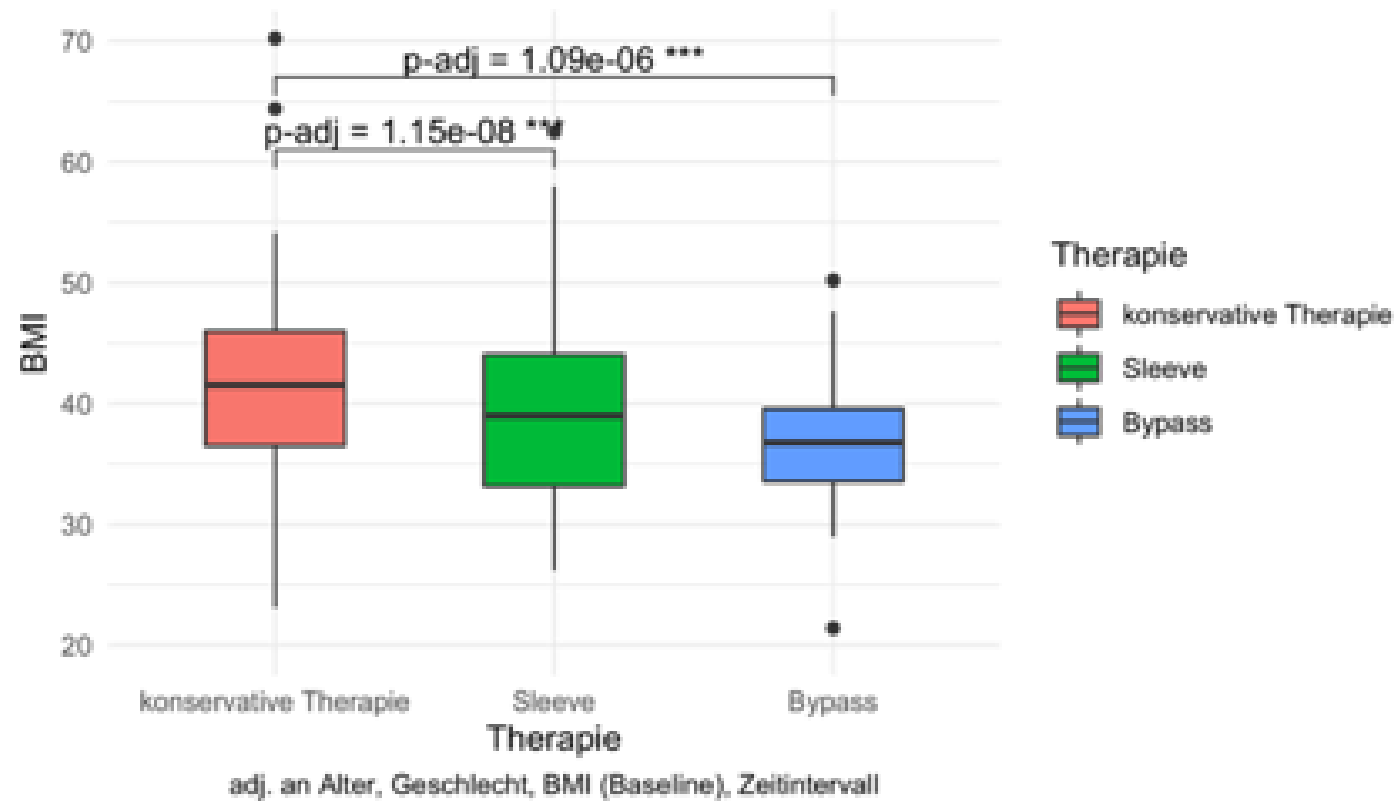
Long term effects of type of intervention on insulin sensitivity
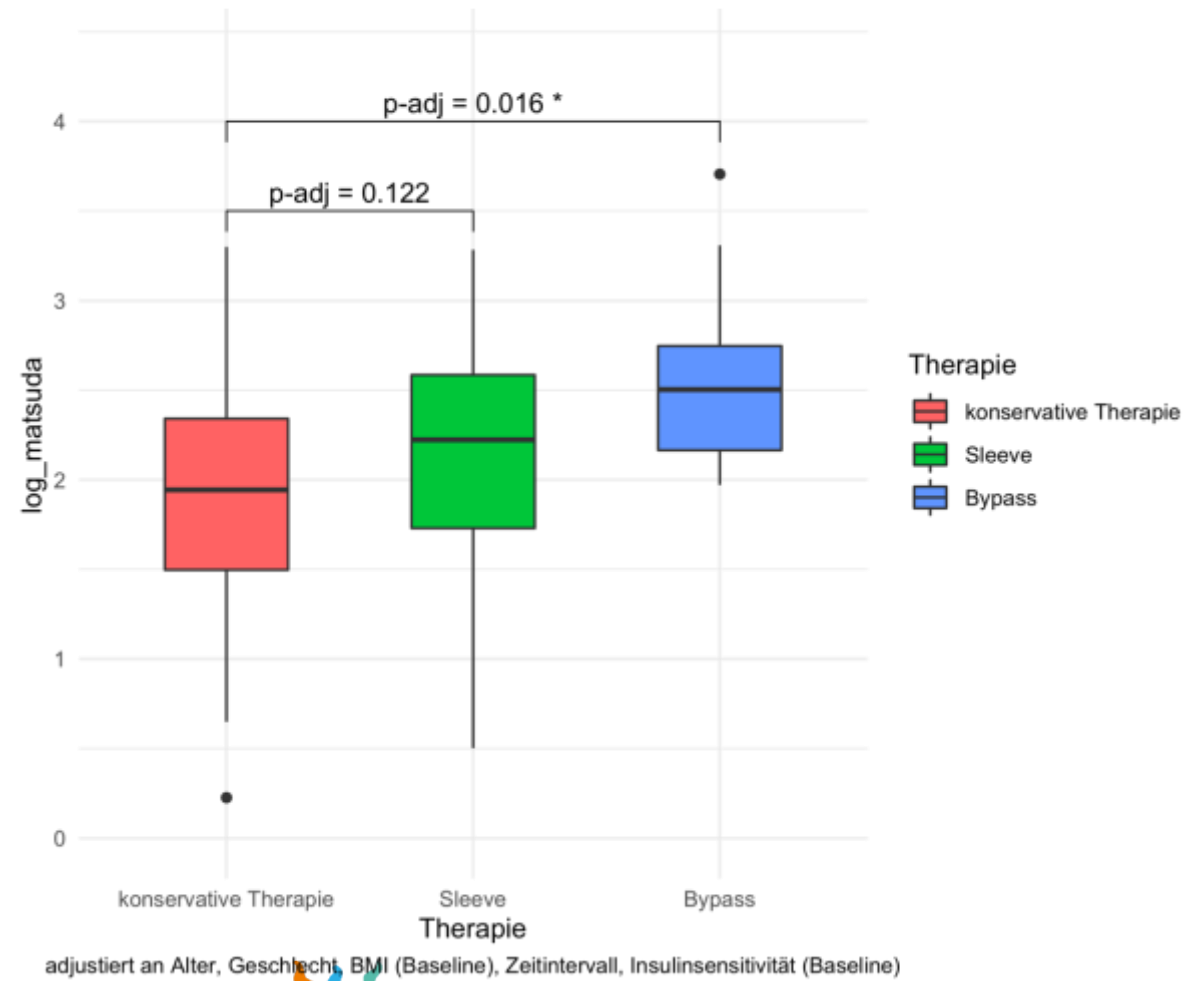
Long term effects of type of intervention on insulin secretion

Relationship between baseline insulin
sensitivity and outcome T2D

Predictors	Odds Ratios	Diabetes CI	p
(Intercept)	0.00	0.00 – 0.42	**0.042**
Diabetes	9.54	2.38 – 46.57	**0.003**
Age	1.09	1.04 – 1.17	**0.002**
Sex [M]	2.72	0.71 – 10.74	0.143
BMI (Baseline)	1.66	0.07 – 38.08	0.749
Follow-Up-Time period	10.38	0.84 – 171.52	0.080
Insulinsensitivity (Baseline)	0.91	0.37 – 2.34	0.843
Observations	109		
R^2 Tjur	0.345		

Relationship between type of intervention and outcome T2D

Predictors	Diabetes		
	Odds Ratios	CI	p
(Intercept)	0.00	0.00 – 0.03	**0.013**
Diabetes	6.30	1.86 – 24.18	**0.004**
Age	1.07	1.02 – 1.13	**0.010**
Sex [M]	1.78	0.53 – 5.87	0.344
BMI (Baseline)	5.15	0.25 – 111.59	0.284
Follow-Up-Time period	7.91	0.85 – 85.47	0.076
Intervention [Sleeve]*	0.35	0.10 – 1.14	0.090
Intervention [Bypass]*	1.00	0.15 – 5.72	0.997
Observations	115		
R^2 Tjur	0.294		

- **Insulin Sensitivity and Secretion**: RYGB improved in this cohort insulin sensitivity but not secretion, while Sleeve Gastrectomy improved insulin secretion but not sensitivity.
- **T2D Prevalence**: Other factors than type of intervention and insulin sensitivity tcould be playing a significant role in the development of diabetes over an extended period
- **Personalized Treatment**: Our findings highlight the importance of precisely categorizing bariatric patients, paving the way for future research to more accurately predict treatment outcomes.

Ergebnisse

Zusammenhang der Insulinsensitivität und Insulinsekretion mit dem Outcome AUC der Glukose

1) Nach Operation

- Modell:

  AUC Glukose (FollowUp)
  ~ Geschlecht
  + Alter
  + FollowUpZeitintervall
  + AUC Glukose (Baseline)
  + Insulinsensitivität **(Baseline)**
  + Insulinsekretion (Baseline)

Prädiktoren	AUC Glukose		
	Estimates	*CI*	*p*
(Intercept)	6.66	1.81 – 11.51	**0.009**
Alter	-0.00	-0.01 – 0.01	0.802
AUC Glukose (Baseline)	-0.43	-1.25 – 0.39	0.291
Geschlecht [männlich]	0.20	-0.03 – 0.44	0.090
BMI (Baseline)	-0.49	-1.07 – 0.09	0.097
Follow-Up-Zeitintervall	0.13	-0.06 – 0.32	0.181
Insulinsekretion (Baseline)	-0.15	-0.48 – 0.18	0.354
Insulinsensitivität (Baseline)	-0.36	-0.64 – -0.07	**0.016**
Observationen	42		
R^2 / R^2 adjustiert	0.402 / 0.279		

Diabetes mellitus - Diagnosekriterien

HbA1c ≥ 6,5 % (≥ 48 mmol/mol)
oder
Nüchternplasmaglukose ≥ 126 mg/dl (≥ 7,0 mmol/l) (nach mindestens acht Stunden Nahrungskarenz)
oder
2-h-Plasmaglukose ≥ 200 mg/dl (≥ 11,1 mmol/l) während eines oralen Glukosetoleranztests (OGTT)
oder
Beliebig gemessene Plasmaglukose ≥ 200 mg/dl (≥ 11,1 mmol/l) bei Patienten mit den typischen Symptomen einer Hyperglykämie oder hyperglykämischen Krise

Prädiabetes - Diagnosekriterien

HbA1c zwischen 5,7 % und 6,4 % (39 - 47 mmol/mol)
oder
Impaired fasting glucose (IFG) 100 - 125 mg/dl (5,6 - 6,9 mmol/l)
oder
Impaired glucose tolerance (IGT) 140 - 199 mg/dl (7,8 - 11,0 mmol/l) als 2h-Wert der Plasmaglukose nach einem OGTT

Ergebnisse

Zusammenhang der Interventionsform mit dem Outcome Insulinsekretion

- Modell:

  Insulinsekretion (FollowUp)
  ~ Geschlecht
  + Alter
  + FollowUpZeitintervall
  + BMI (Baseline)
  + Insulinsensivität (FollowUp)
  + Insulinsekretion (Baseline)
  + Interventionsform

Prädiktoren	Insulinsekretion		
	Estimates	*CI*	*p*
(Intercept)	5.17	3.24 – 7.10	**<0.001**
Alter	-0.01	-0.01 – 0.00	0.090
Geschlecht [männlich]	-0.06	-0.25 – 0.13	0.532
BMI (Baseline)	-0.39	-0.82 – 0.03	0.071
Follow-Up-Zeitintervall	-0.21	-0.51 – 0.10	0.181
Insulinsekretion (Baseline)	0.47	0.24 – 0.70	**<0.001**
Insulinsensitivität (Follow-Up)	-0.17	-0.30 – -0.05	**0.006**
Therapie [Sleeve]*	0.27	0.11 – 0.42	**0.001**
Therapie [Bypass]*	0.10	-0.14 – 0.34	0.410
Observationen	87		
R^2 / R^2 adjustiert	0.453 / 0.397		