**SUPPORTING INFORMATION (SI) FILE**

**Title**: Perturbations of fibroblast growth factors 19 and 21 in type 2 diabetes

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***Table A***. **Descriptive characteristics of study cohorts divided according to their preoperative status of diabetes (SD: Standard deviation)**.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **No-Diabetes****(No-T2D)****N=66** | **Diabetes****(T2D)****N=62** | **P-value** |
| Age (years),mean (SD) | 40.1 (8.6) | 50.6 (10.6) | **<0.00011** |
| Female(%) | 89% | 79% | 0.1072 |
| White race(%) | 95% | 100% | 0.2453 |
| Height (cm),mean (SD) | 165.0 (8.2) | 164.9 (8.9) | 0.9731 |
| Weight (kg),mean (SD) | 136.8 (31.6) | 134.3 (25.0) | 0.6201 |
| BMI (kg/m2),mean (SD) | 50.0 (9.4) | 49.3 (8.0) | 0.6531 |
| Glucose (mg/dL),mean (SD) | 85.7 (7.6) | 130.4 (68.0) | **<0.00011** |
| Insulin (µU/mL),mean (SD) | 18.4 (13.3) | 22.2 (16.9) | 0.1631 |
| HbA1c (%),mean (SD) | 5.4 (0.2) | 7.3 (1.3) | **<0.00011** |
| LDL (mg/dL),mean (SD) | 112.5 (30.3) | 90.5 (34.9) | **0.00031** |
| HDL (mg/dL),mean (SD) | 48.3 (12.6) | 43.7 (8.6) | **0.0161** |
| Cholesterol (mg/dL),mean (SD) | 188.7 (37.5) | 169.3 (41.3) | **0.00621** |
| Triglycerides (mg/dL),mean (SD) | 139.2 (77.3) | 181.4 (96.4) | **0.00701** |
| 1T-test, 2Chi-square test, 3Fisher’s exact test |

***Table B*.** **Descriptive characteristics of study cohorts divided according to their diabetes remission status after Roux-en-Y gastric bypass (RYGB) surgery (SD: standard deviation)**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **No-Diabetes****(No-T2D)****(N=66)** | **Diabetes with remission****(T2D-R)****(N=26)** | **Diabetes without remission****(T2D-NoR)****(N=36)** | **P-value** |
| Age (years),mean (SD) | 40.1 (8.6) | 45.8 (11.4) | 54.1 (8.6) | **<0.00011** |
| Female(%) | 89% | 81% | 78% | 0.2592 |
| White race(%) | 95% | 100% | 100% | 0.4303 |
| Height (cm),mean (SD) | 165.0 (8.2) | 165.3 (9.2) | 164.6 (8.8) | 0.9521 |
| Weight (kg),mean (SD) | 136.8 (31.6) | 138.1 (29.1) | 131.5 (21.7) | 0.5931 |
| BMI (kg/m2),mean (SD) | 50.0 (9.4) | 50.5 (9.4) | 48.5 (6.8) | 0.5951 |
| Glucose (mg/dL),mean (SD) | 85.7 (7.6) | 116.2 (43.0) | 140.7 (80.5) | **<0.00011** |
| Insulin (µU/mL),mean (SD) | 18.4 (13.3) | 24.5 (15.7) | 20.6 (17.8) | 0.2351 |
| HbA1c (%),mean (SD) | 5.4 (0.2) | 6.8 (1.1) | 7.7 (1.4) | **<0.00011** |
| LDL (mg/dL),mean (SD) | 112.5 (30.3) | 103.3 (34.1) | 81.1 (32.9) | **<0.00011** |
| HDL (mg/dL),mean (SD) | 48.3 (12.6) | 43.5 (10.3) | 43.8 (7.4) | 0.0591 |
| Cholesterol (mg/dL),mean (SD) | 188.7 (37.5) | 176.2 (42.1) | 164.3 (40.5) | **0.0121** |
| Triglycerides (mg/dL),mean (SD) | 139.2 (77.3) | 154.5 (83.0) | 200.8 (101.6) | **0.00311** |
| 1ANOVA, 2Chi-square test, 3Fisher’s exact test |

***Table C*. List of the 205 clinical variables that were used in the phenome-wide association analysis (PheWAS).**

***Baseline information and demographics (n=15)***

1. Age
2. Alcohol use
3. BMI at baseline
4. Days in pre-operative program
5. Ethnic group
6. Gender
7. Height
8. Number of co-morbidities (from list below)
9. Number of medications (from list below)
10. Preoperative weight loss
11. Rating from initial dietician evaluation (red, yellow, green)
12. Rating from initial psychological evaluation (red, yellow, green)
13. REE
14. Smoker
15. Waist circumference

***Comorbidities on problem list from baseline to surgery using 3-digit ICD, codes (n=50)***

* 1. ICD\_244
	2. ICD\_250
	3. ICD\_251
	4. ICD\_256
	5. ICD\_268
	6. ICD\_269
	7. ICD\_272
	8. ICD\_274
	9. ICD\_276
	10. ICD\_296
	11. ICD\_300
	12. ICD\_305
	13. ICD\_307
	14. ICD\_309
	15. ICD\_311
	16. ICD\_327
	17. ICD\_346
	18. ICD\_354
	19. ICD\_357
	20. ICD\_401
	21. ICD\_414
	22. ICD\_427
	23. ICD\_428
	24. ICD\_429
	25. ICD\_477
	26. ICD\_493
	27. ICD\_530
	28. ICD\_553
	29. ICD\_564
	30. ICD\_592
	31. ICD\_625
	32. ICD\_626
	33. ICD\_627
	34. ICD\_715
	35. ICD\_719
	36. ICD\_722
	37. ICD\_724
	38. ICD\_726
	39. ICD\_728
	40. ICD\_729
	41. ICD\_780
	42. ICD\_782
	43. ICD\_784
	44. ICD\_785
	45. ICD\_786
	46. ICD\_787
	47. ICD\_789
	48. ICD\_790
	49. ICD\_794
	50. ICD\_796

***Medications on reconciliation list from baseline to 1 month prior to surgery using subclass (n=92)***

* 1. ACE
	2. Aminopenicillins
	3. AnalgesicCombo
	4. AnalgOther
	5. AnorexNonAmph
	6. AntiadrenergicAntiHTN
	7. AntianxietyAgentsMisc
	8. AnticonvMisc
	9. AnticonvulsantsBenzod
	10. AntidepressMisc
	11. AntiemetAnticholinergic
	12. AntifungalsTopical
	13. AntihistNonsed
	14. AntihistPhenothiazines
	15. AntiHTNcomb
	16. AntihyperlipidCombo
	17. AntiInfectiveAgentsMisc
	18. AntiInfectiveMiscCombo
	19. AntiObesityAgents
	20. AntiparkinDopaminergic
	21. Antitussives
	22. ARB
	23. Azithromycin
	24. BBCS
	25. BBNS
	26. Benzod
	27. Biguanides
	28. BronchoAnticholinergics
	29. BulkLaxatives
	30. Calcium
	31. CCB
	32. Cephalosporins1stGen
	33. Clarithromycin
	34. Cobalamins
	35. ComboContraceptOral
	36. CorticTopical
	37. Cough\_Cold\_AllComb
	38. Coumarin
	39. Dibenzapines
	40. DiureticCombo
	41. Estrogens
	42. FibricAcid
	43. Fluoroquinolones
	44. FolicAcidFolates
	45. GastrointestlStimulants
	46. Glucocort
	47. GoutAgents
	48. H2
	49. Heparin
	50. ImidazoleRelatedAntifungal
	51. IncretinMimetAgGLP1
	52. InsSensAgents
	53. Insulin
	54. IntestCholAbsorptionInhib
	55. Iron
	56. LeukotrieneModulators
	57. LoopDiur
	58. ModifiedCyclics
	59. MultiVit
	60. MultiVitMinerals
	61. MuscleRelax
	62. NasalSteroids
	63. Nitrates
	64. NonBarbitHypnotics
	65. NSAID
	66. OilSolVit
	67. OpioidAgonist
	68. OpioidCombo
	69. PenicillinCombo
	70. PlateAggrInhibitors
	71. Potassium
	72. PotassiumSparingDiuretics
	73. PPI
	74. ProgestContratInjectable
	75. Progestins
	76. Salicylates
	77. SerotoninAgonists
	78. SmokingDeterrents
	79. SNRI
	80. SSRI
	81. Statins
	82. SteroidInhalants
	83. Sulfonylureas
	84. SurfactantLaxatives
	85. Sympath
	86. Tetracyclines
	87. Thiazides
	88. ThyroidHorm
	89. Tricyclic
	90. UlcerTherapyCombo
	91. UrinaryAntispasmodics
	92. WaterSolubleVitamins

***Labs prior to surgery found in >50% of population (n=45)***

* 1. AlkPhos
	2. ALT
	3. AnionGap
	4. AST
	5. bun
	6. calcium
	7. CHLORIDE
	8. CHOL
	9. CholHDLRat
	10. CO2
	11. creat
	12. Creatinine, RD Urine
	13. Ferritin
	14. FolicAcid
	15. GFR
	16. glucose
	17. hba1c
	18. HCT
	19. HDL
	20. HEMOGLOBIN
	21. IBC
	22. insulin
	23. Iron
	24. LDL
	25. MCH
	26. MCHC
	27. MCV
	28. MPV
	29. PLATELET
	30. potassium
	31. Prot/Creat Ratio
	32. Protein, RD Urine
	33. PTH
	34. RBC
	35. RDW
	36. sodium
	37. TotBili
	38. TransSat
	39. TRIG
	40. TSH
	41. Vitamin D 25 OH D2
	42. Vitamin D 25 OH D3
	43. Vitamin D 25 TOTAL
	44. WBC
	45. Zinc levels

***Perioperative information and liver pathology (n=3)***

* 1. Access (Laparoscopic versus Open)
	2. Steatosis
	3. Any fibrosis