**Supplemental Table 1. Baseline characteristics and prevalence of diabetes complications by etiology of diabetes (T1DM vs. T2DM) and gastric emptying scintigraphy (delayed vs. not delayed)**

|  | **T1DM** | **T2DM** |  |
| --- | --- | --- | --- |
| **Baseline Characteristics** | **Delayed Emptying****(N=48)** | **Normal Emptying****(N=11)** | **Delayed Emptying****(N=55)** | **Normal Emptying****(N=19)** | **P** |
| Age at enrollment (yrs), mean (SD) | 44.2 (12.1) | 37.0 (17.0) | 51.1 (9.5) | 56.9 (9.4) | <0.001 |
| Gender |  |  |  |  |  |
|  Female | 33 (69%) | 10 (91%) | 44 (80%) | 14 (74%) | 0.38 |
|  Male | 15 (31%) | 1 (9%) | 11 (20%) | 5 (26%) |  |
| BMI, mean (SD) | 27.7 (6.5) | 28.4 (5.7) | 32.3 (7.8) | 35.3 (10.7) | <0.001 |
| Duration of Gp symptom onset (years), median (IQR) | 5.4 (2.4, 10.6) | 4.5 (1.1, 5.8) | 2.6 (1.6, 5.1) | 3.3 (1.6, 8.2) | 0.008 |
| Duration of diabetes (years), median (IQR) | 23.3 (17.2, 33.3) | 9.5 (7.6, 24.9) | 15.6 (11.5, 20.8) | 14.7 (9.2, 20.5) | <0.001 |
| Duration between diabetes diagnosis and Gp symptom onset (years), median (IQR) | 15.0 (10.8, 25.0) | 7.9 (3.7, 19.1) | 12.1 (6.1, 16.8) | 9.7 (6.5, 12.8) | 0.03 |
| **Diabetes Complications** |  |  |  |  |  |
| Retinopathy | 20 (42%) | 2 (18%) | 17 (31%) | 1 (5%) | 0.02 |
| Nephropathy | 9 (19%) | 2 (18%) | 7 (13%) | 1 (5%) | 0.53 |
| Peripheral neuropathy | 27 (56%) | 4 (36%) | 24 (44%) | 5 (26%) | 0.14 |
| Laser treatment for diabetic retinopathy | 15 (31%) | 2 (18%) | 7 (13%) | 0 (0%) | 0.008 |
| Diabetic ketoacidosis | 24 (50%) | 4 (36%) | 9 (16%) | 0 (0%) | <0.001 |
| Number of triopathies present  |  |  |  |  | 0.17 |
| 0 | 15 (31%) | 6 (55%) | 25 (45%) | 13 (68%) |  |
| 1 | 15 (31%) | 3 (27%) | 14 (25%) | 5 (26%) |  |
| 2 | 13 (27%) | 1 (9%) | 14 (25%) | 1 (5%) |  |
| 3 | 5 (10%) | 1 (9%) | 2 (4%) | 0 (0%) |  |
| Mean (SD) number of triopathies present | 1.2 (1.0) | 0.7 (1.0) | 0.9 (0.9) | 0.4 (0.6) | 0.02 |
| Migraine headaches | 11 (23%) | 2 (18%) | 12 (22%) | 7 (37%) | 0.58 |
| Gastric Emptying Scintigraphy - % retained at: |  |  |  |  |  |
| 1 hour (%), mean (SD) | 82.1 (13.0) | 54.1 (12.4) | 82.6 (14.2) | 56.1 (22.2) | <0.001 |
| 2 hours (%), mean (SD) | 66.3 (19.6) | 22.6 (14.3) | 68.7 (21.2) | 29.1 (17.2) | <0.001 |
| 4 hours (%), mean (SD) | 39.9 (24.6) | 4.4 (3.0) | 43.6 (26.4) | 4.5 (2.6) | <0.001 |
| GCSI |  |  |  |  |  |
| GCSI total score, mean (SD) | 2.9 (1.2) | 2.3 (1.5) | 2.4 (1.2) | 2.3 (0.8) | 0.07 |
| Nausea/vomiting/retching, mean (SD) | 2.2 (1.6) | 2.0 (1.5) | 1.9 (1.5) | 1.5 (1.2) | 0.32 |
| Bloating, mean (SD) | 3.2 (1.7) | 2.4 (2.1) | 2.5 (1.6) | 2.2 (1.8) | 0.10 |
| Fulless/early satiety, mean (SD) | 3.3 (1.3) | 2.5 (1.8) | 2.9 (1.2) | 3.1 (1.2) | 0.20 |
| PAGI-SYM individual scores |  |  |  |  |  |
| Nausea, mean (SD) | 3.1 (1.5) | 2.7 (1.7) | 2.6 (1.6) | 2.7 (1.5) | 0.44 |
| Retching, mean (SD) | 1.7 (1.8) | 1.5 (1.6) | 1.5 (1.6) | 0.8 (1.2) | 0.28 |
| Vomiting, mean (SD) | 1.9 (1.9) | 1.7 (1.8) | 1.7 (1.7) | 1.0 (1.5) | 0.28 |
| Stomach fullness, mean (SD) | 3.6 (1.3) | 2.5 (1.9) | 2.9 (1.4) | 3.3 (1.2) | 0.03 |
| Unable to finish normal meal, mean (SD) | 3.1 (1.7) | 2.5 (1.9) | 2.9 (1.5) | 3.0 (1.5) | 0.72 |
| Feel excessively full after meals, mean (SD) | 3.6 (1.5) | 2.5 (2.3) | 3.4 (1.3) | 3.4 (1.3) | 0.13 |
| Loss of appetite, mean (SD) | 3.0 (1.7) | 2.6 (1.7) | 2.4 (1.6) | 2.6 (1.6) | 0.35 |
| Bloating, mean (SD) | 3.3 (1.6) | 2.4 (2.2) | 2.7 (1.6) | 2.3 (1.9) | 0.06 |
| Stomach visibly larger, mean (SD) | 3.0 (1.9) | 2.4 (2.1) | 2.3 (1.8) | 2.2 (1.9) | 0.18 |
| Upper abdominal pain, mean (SD) | 2.6 (1.6) | 2.2 (1.7) | 2.3 (1.9) | 1.5 (1.4) | 0.17 |
| Upper abdominal discomfort, mean (SD) | 2.9 (1.6) | 2.1 (1.8) | 2.7 (1.7) | 2.6 (1.2) | 0.53 |
| NTSS-6, mean (SD) | 8.3 (7.2) | 5.8 (6.0) | 8.3 (7.4) | 6.3 (6.2) | 0.52 |
| NTSS-6 score >6 | 23 (49%) | 5 (45%) | 28 (52%) | 8 (42%) | 0.91 |
| Laboratory Results |  |  |  |  |  |
| Glucose (mg/dL), median (IQR) | 181.5 (129.0, 280.0) | 171.0 (129.0, 267.0) | 163.0 (103.0, 248.0) | 161.0 (119.0, 233.0) | 0.46 |
| HbA1c (%), median (IQR) | 8.8 (7.6, 9.7) | 9.0 (7.5, 9.8) | 8.0 (6.5, 9.6) | 7.7 (6.4, 8.5) | 0.05 |
| Creatinine (mg/dL) – mean (SD) | 1.1 (0.6) | 0.8 (0.3) | 0.9 (0.4) | 0.9 (0.3) | 0.05 |
| Creatine>1.5 mg/dL | 9 (19%) | 0 (0%) | 4 (7%) | 1 (5%) | 0.17 |
| ESR (mm/hr), median (IQR) | 15.0 (7.0, 35.0) | 20.0 (4.0, 29.0) | 33.0 (20.0, 49.0) | 27.0 (9.0, 38.0) | 0.004 |
| C-reactive protein (CRP) (mg/dL), median (IQR) | 0.6 (0.2, 3.3) | 0.3 (0.2, 1.0) | 1.8 (0.4, 3.7) | 1.1 (0.3, 4.4) | 0.06 |
| Vitamin B12 (pg/mL), median (IQR) | 610.0 (503.5, 910.0) | 492.0 (342.0, 826.0) | 489.0 (307.0, 748.0) | 533.0 (414.0, 896.0) | 0.08 |
| Autonomic Function |  |  |  |  |  |
| Low resting parasympathetic activity | 29 (62%) | 6 (55%) | 25 (45%) | 9 (47%) | 0.40 |
| Resting parasympathetic excess | 1 (2%) | 1 (9%) | 8 (15%) | 3 (16%) | 0.08 |
| Challenge parasympathetic excess | 20 (43%) | 0 (0%) | 14 (26%) | 3 (17%) | 0.01 |
| Water load test – volume consumed (mL), mean (SD) | 375.0 (231.1) | 467.1 (209.5) | 395.5 (259.1) | 427.7 (201.2) | 0.66 |
| Abnormal water load test (≤238mL consumed) | 13 (27%) | 1 (10%) | 15 (27%) | 3 (16%) | 0.57 |

 **Supplemental** **Table 2. Electrogastrography (EGG) with water load by diabetes type and complications**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Electrogastrography (EGG)** | **Diabetes Type** |  | **Delayed gastric emptying** | **Retinopathy** |  | **Nephropathy** |  | **Peripheral Neuropathy** |  |
| **Average power by frequency region (%) – Mean (SD)** | **Type 1****(N=58)** | **Type 2****(N=74)** | **P** | **Yes****(N=103)** | **No (N=29)** | **P** | **Yes****(N=40)** | **No****(N=92)** | **P** | **Yes****(N=19)** | **No****(N=113)** | **P** | **Yes****(N=60)** | **No****(N=72)** | **P** |
| Bradygastria (1 - <2.5 cpm) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Baseline (BL) | 47.1 (23.4) | 52.7 (22.1) | 0.16 | 48.4 (22.9) | 56.9 (21.3) | 0.08 | 49.0 (25.2) | 50.8 (21.7) | 0.69 | 59.1 (26.7) | 48.7 (21.8) | 0.07 | 47.6 (23.5) | 52.4 (22.0) | 0.23 |
| Post-satiety change from BL | 2.9 (21.4) | -4.6 (21.3) | 0.15 | -0.4 (22.3) | -4.5 (19.0) | 0.37 | -2.3 (24.2) | -0.9 (20.5) | 0.46 | -11.4 (18.7) | 0.4 (21.7) | 0.17 | -0.1 (22.2) | -2.3 (21.2) | 0.83 |
| Normogastria (2.5 - <3.8 cpm) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Baseline (BL) | 21.9 (16.1) | 15.3 (8.4) | 0.003 | 17.9 (12.8) | 19.3 (12.9) | 0.59 | 18.5 (15.4) | 18.1 (11.5) | 0.86 | 14.7 (11.6) | 18.8 (12.9) | 0.20 | 18.0 (11.7) | 18.3 (13.7) | 0.90 |
| Post-satiety change from BL | -0.4 (16.9) | 1.5 (11.0) | 0.12 | 0.7 (13.3) | 0.5 (16.0) | 0.96 | -0.2 (15.9) | 1.1 (13.0) | 0.62 | 6.5 (11.5) | -0.3 (14.1) | 0.13 | 1.3 (11.5) | 0.2 (15.6) | 0.62 |
| Tachygastria (3.8 – 10 cpm) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Baseline (BL) | 23.8 (15.5) | 24.6 (15.0) | 0.76 | 25.9 (16.0) | 18.3 (9.9) | 0.02 | 25.4 (17.8) | 23.7 (13.9) | 0.57 | 19.9 (17.1) | 25.0 (14.8) | 0.17 | 26.5 (16.1) | 22.4 (14.2) | 0.12 |
| Post-satiety change from BL | -1.4 (13.0) | 2.7 (13.6) | 0.03 | 0.3 (14.3) | 3.1 (9.9) | 0.31 | 1.4 (14.7) | 0.7 (12.9) | 0.51 | 4.0 (13.5) | 0.4 (13.4) | 0.67 | -0.7 (15.0) | 2.2 (11.9) | 0.64 |
| Duodenal (> 10-15 cpm) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Baseline (BL) | 7.2 (7.1) | 7.4 (8.0) | 0.86 | 7.8(7.1) | 5.5 (8.8) | 0.14 | 7.1 (6.3) | 7.4 (8.1) | 0.83 | 6.3 (8.1) | 7.5 (7.5) | 0.51 | 7.9 (7.3) | 6.9 (7.8) | 0.47 |
| Post-satiety change from BL | -1.1 (5.8) | 0.4 (6.8) | 0.06 | -0.6 (7.0) | 0.8 (3.7) | 0.31 | 1.2 (5.5) | -0.9 (6.7) | 0.06 | 0.9 (6.3) | -0.4 (6.4) | 0.57 | -0.5 (7.3) | -0.0 (5.5) | 0.97 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Supplemental Table 3. Autonomic function by diabetes type and complications**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Autonomic function** | **Diabetes Type** |  | **Delayed Gastric Emptying** | **Retinopathy** |  | **Nephropathy** |  | **Peripheral Neuropathy** |  |
| **Average power by frequency region (%) – Median (IQR)** | **Type 1****(N=59)** | **Type 2****(N=74)** | **P** | **Yes****(N=103)** | **No****(N=30)** | **P** | **Yes****(N=40)** | **No****(N=93)** | **P** | **Yes****(N=19)** | **No****(N=114)** | **P** | **Yes****(N=60)** | **No****(N=73)** | **P** |
| Resting sympathetic activity (LFa bpm2) | 0.5(0.2, 1.2) | 1.0(0.3, 3.6) | 0.08 | 0.7 (0.3, 2.1) | 0.5 (0.2, 4.4) | 0.83 | 0.5 (0.2, 1.9) | 0.8 (0.3, 3.1) | 0.26 | 0.5 (0.2, 3.0) | 0.7 (0.3, 2.3) | 0.54 | 0.6 (0.2, 2.1) | 0.8 (0.3, 2.7) | 0.24 |
| Resting parasympathetic activity (RFa bpm2) | 0.3(0.2, 1.4) | 0.6(0.3, 2.5) | 0.04 | 0.4 (0.2, 1.5) | 0.6 (0.2, 2.7) | 0.32 | 0.4 (0.2, 1.4) | 0.4 (0.2, 2.1) | 0.63 | 0.4 (0.3, 2.2) | 0.5 (0.2, 1.8) | 0.96 | 0.3 (0.1, 1.8) | 0.6 (0.3, 1.9) | 0.05 |
| Resting sympathovagal balance (LFa/RFa) | 1.6(1.0, 2.5) | 1.5(0.7, 3.0) | 0.80 | 1.6 (0.8, 3.0) | 1.4 (0.7, 1.9) | 0.24 | 1.5 (0.6, 3.0) | 1.6 (0.8, 2.6) | 0.62 | 1.2 (0.5, 1.8) | 1.6 (0.8, 3.0) | 0.12 | 1.6 (0.8, 3.3) | 1.5 (0.7, 2.4) | 0.35 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Low resting sympathetic activity | 26 (45%) | 29 (39%) | 0.59 | 40 (39%) | 15 (50%) | 0.30 | 20 (50%) | 35 (38%) | 0.25 | 9 (47%) | 46 (41%) | 0.62 | 28 (47%) | 27 (38%) | 0.29 |
| Low resting parasympathetic activity | 35 (60%) | 34 (46%) | 0.12 | 54 (53%) | 15 (50%) | 0.84 | 21 (53%) | 48 (52%) | 1.00 | 12 (63%) | 57 (50%) | 0.33 | 37 (62%) | 32 (44%) | 0.06 |
| Resting sympathetic excess | 4 (7%) | 14 (19%) | 0.07 | 13 (13%) | 5 (17%) | 0.56 | 4 (10%) | 14 (15%) | 0.58 | 3 (16%) | 15 (13%) | 0.72 | 9 (15%) | 9 (13%) | 0.80 |
| Resting parasympathetic excess | 2 (3%) | 11 (15%) | 0.04 | 9 (9%) | 4 (13%) | 0.49 | 2 (5%) | 11 (12%) | 0.34 | 2 (11%) | 11 (10%) | 1.00 | 5 (8%) | 8 (11%) | 0.77 |
| Low sympathetic response to challenge | 49 (84%) | 61 (91%) | 0.28 | 87 (89%) | 23 (85%) | 0.74 | 38 (95%) | 72 (85%) | 0.14 | 17 (100%) | 93 (86%) | 0.22 | 53 (93%) | 57 (84%) | 0.17 |
| Challenge sympathetic excess | 1 (2%) | 2 (4%) | 1.00 | 3 (4%) | 0 (0%) | 1.00 | 1 (3%) | 2 (3%) | 1.00 | 0 (0%) | 3 (3%) | 1.00 | 1 (2%) | 2 (4%) | 1.00 |
| Challenge parasympathetic excess | 20 (34%) | 17 (24%) | 0.18 | 34 (34%) | 3 (10%) | 0.02 | 8 (20%) | 29 (32%) | 0.21 | 5 (28%) | 32 (29%) | 1.00 | 18 (31%) | 19 (26%) | 0.56 |
| Low parasympathetic response to challenge | 48 (83%) | 60 (81%) | 0.82 | 84 (82%) | 24 (80%) | 0.79 | 35 (88%) | 73 (79%) | 0.33 | 13 (72%) | 95 (83%) | 0.32 | 50 (83%) | 58 (81%) | 0.82 |