The JDRF Continuous Glucose Monitoring Study Group

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Disclosure

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Below is a listing of relationships of the investigators with companies that make products relevant to the manuscript between July 1, 2006 and October 26, 2009. Research funds where listed below were provided to the legal entity that employs the individual and not directly to the individual.

Jennifer M. Block, RN, CDE reports having received honoraria from Abbott Diabetes Care, Inc. and Medtronic MiniMed, Inc., and serving on a medical advisory board for Tandem Diabetes and Arkal Medical; Dr. Bode reports having received consulting fees, honoraria, travel reimbursement, and research funds from Abbott Diabetes Care, Inc., and Medtronic MiniMed, Inc., and grant support from DexCom, Inc.; Dr. Buckingham reports having received a speaker honorarium and research funding from Abbott Diabetes Care, Inc., a fee for serving on a medical advisory board for Lifescan, Inc., a speaker honorarium, consulting fees, and research funding from Medtronic MiniMed, Inc., and a consulting fee from Novo Nordisk, Inc.; Dr. Chase reports having received a speaker honorarium from Abbott Diabetes Care, Inc. and Sanofi-Aventis, and grant support from Symlin; Dr. Fiallo-Scharerer reports having received supplies for research from Abbott Diabetes Care, Inc. and Medtronic MiniMed, Inc.; Dr. Fox reports having received supplies for research from Abbott Diabetes Care, Inc. and Smiths Medical; Dr. Hirsch reports having received consulting fees and travel reimbursement from Abbott Diabetes Care, Inc., and grant support from Medtronic MiniMed, Inc.; Dr. Kollman reports having received consulting fees from Medtronic MiniMed, Inc.; Kerry Milaszewski, RN, CDE reports having received consulting fees from Medtronic MiniMed, Inc.; Dr. Laffel reports having received consulting fees from Lifescan, Inc., consulting fees and a speaker honorarium from Abbott Diabetes Care, Inc., consulting fees and research funding from Medtronic MiniMed, Inc., and consulting and speaker fees from Roche; Dr. Mauras reports having received grant support from Medtronic MiniMed, Inc.; Dr. Tamborlane reports having received consulting fees from Abbott Diabetes Care, Inc. and Lifescan, Inc. and consulting fees, a speaker honorarium, and research funding from Medtronic MiniMed, Inc.; Dr. Weinlizer reports having received research support and a speaker honorarium from Medtronic MiniMed, Inc.; Dr. Wolpert reports having received consulting fees from Abbott Diabetes Care, Inc. and research funding from Medtronic MiniMed, Inc.
Figure A-1. Mean glucose by age group (error bars represent one standard deviation). There was a slight association of lower age and higher mean glucose level (P=0.009) which was seen both during the day (P=0.04) and overnight (P<0.001).
Figure A-2. Mean glucose values by time of day for entire study population and by age group. Shaded area represents nighttime values (midnight – 6 a.m.). P=0.009 for the association of overall mean glucose with age; P=0.04 for the association of mean glucose with age during the daytime; P<0.001 for the association of mean glucose with age overnight. All P values are after adjusting for device type.
Table A-1. Sensor Glucose Values and Glucose Variability by Device Type

|                      | DexCom | Guardian | Navigator |
|----------------------|--------|----------|-----------|
|                      | N=35   | N=38     | N=36      |
| HbA1c (%) (mean±SD)  | 5.3±0.3| 5.3±0.2  | 5.3±0.3   |
| Mean sensor glucose (mean±SD) |        |          |           |
| Overall              | 101±11 | 98±9     | 98±11     |
| Daytime (6 a.m.-12 a.m.) | 101±11 | 98±10    | 100±10    |
| Nighttime (12 a.m.-6 a.m.) | 98±17  | 96±11    | 93±16     |
| Mean peak sensor glucose (mean±SDmedian) † |        |          |           |
| Daytime (6 a.m.-12 a.m.) | 163    | 129      | 133       |
| Nighttime (12 a.m.-6 a.m.) | 128    | 110      | 106       |
| Mean nadir sensor glucose (mean±SDmedian) † |        |          |           |
| Daytime (6 a.m.-12 a.m.) | 67     | 72       | 75        |
| Nighttime (12 a.m.-6 a.m.) | 72     | 83       | 79        |
| Distribution of sensor glucose levels (median) |        |          |           |
| 71-120 mg/dL         | 65.9%  | 88.5%    | 92.0%     |
| ≤70 mg/dL            | 7.2%   | 2.8%     | 0.9%      |
| ≤60 mg/dL            | 1.3%   | 0.1%     | 0.2%      |
| >120 mg/dL           | 17.0%  | 5.7%     | 5.4%      |
| >140 mg/dL           | 7.8%   | 0.4%     | 0.6%      |
| Overall glucose variability (median) |        |          |           |
| Standard deviation (mg/dL) | 26.7  | 14.6     | 12.7      |
| Absolute rate of change (mg/dL/minute) | 0.73  | 0.31     | 0.36      |
| Coefficient of variation (%) ‡ | 27    | 15       | 13        |
| Mean amplitude of glycemic excursions (mg/dL) | 47.1  | 28.3     | 27.1      |

† The calculation of peak and nadir glucose was restricted to days with ≥12 hours and nights with ≥4 hours of glucose data.
‡SD divided by mean glucose, expressed as a percentage.
Table A-2 Distribution of Glycemic Indices by Age Group for Various Glucose Levels

| Glucose Level       | All N=74 | 8-<15 N=20 | 15-<25 N=17 | 25-<45 N=20 | ≥45 N=17 |
|---------------------|----------|------------|-------------|-------------|---------|
| **Below 70 mg/dL**  |          |            |             |             |         |
| Median              | 1.7%     | 1.8%       | 0.6%        | 2.9%        | 1.6%    |
| 0%                  | 21 (28%) | 6 (30%)    | 5 (29%)     | 5 (25%)     | 5 (29%) |
| >0 to <1%           | 13 (18%) | 2 (10%)    | 5 (29%)     | 4 (20%)     | 2 (12%) |
| 1% to <5%           | 17 (23%) | 7 (35%)    | 2 (12%)     | 4 (20%)     | 4 (24%) |
| 5% to <10%          | 11 (15%) | 4 (20%)    | 1 (6%)      | 3 (15%)     | 3 (18%) |
| 10% to <15%         | 6 (8%)   | 1 (5%)     | 2 (12%)     | 1 (5%)      | 2 (12%) |
| ≥15%                | 6 (8%)   | 0          | 2 (12%)     | 3 (15%)     | 1 (6%)  |
| **Below 60 mg/dL**  |          |            |             |             |         |
| Median              | 0.2%     | 0.2%       | 0.0%        | 0.2%        | 0.1%    |
| 0%                  | 33 (45%) | 8 (40%)    | 9 (53%)     | 8 (40%)     | 8 (47%) |
| >0 to <1%           | 18 (24%) | 6 (30%)    | 3 (18%)     | 5 (25%)     | 4 (24%) |
| 1% to <5%           | 14 (19%) | 5 (25%)    | 2 (12%)     | 4 (20%)     | 3 (18%) |
| 5% to <10%          | 5 (7%)   | 1 (5%)     | 1 (6%)      | 1 (5%)      | 2 (12%) |
| 10% to <15%         | 3 (4%)   | 0          | 2 (12%)     | 1 (5%)      | 0       |
| ≥15%                | 1 (1%)   | 0          | 0           | 1 (5%)      | 0       |
| **Below 50 mg/dL**  |          |            |             |             |         |
| Median              | 0.0%     | 0.0%       | 0.0%        | 0.0%        | 0.0%    |
| 0%                  | 49 (66%) | 14 (70%)   | 11 (65%)    | 14 (70%)    | 10 (59%)|
| >0 to <1%           | 11 (15%) | 2 (10%)    | 2 (12%)     | 2 (10%)     | 5 (29%) |
| 1% to <5%           | 12 (16%) | 4 (20%)    | 4 (24%)     | 2 (10%)     | 2 (12%) |
| 5% to <10%          | 2 (3%)   | 0          | 0           | 2 (10%)     | 0       |
| **Within 71-120 mg/dL** |        |            |             |             |         |
| Median              | 91.0%    | 85.1%      | 87.9%       | 91.4%       | 93.7%   |
| 95-<100%            | 14 (19%) | 2 (10%)    | 5 (29%)     | 2 (10%)     | 5 (29%) |
| 90-<95%             | 24 (32%) | 5 (25%)    | 3 (18%)     | 9 (45%)     | 7 (41%) |
| 80%<90%             | 16 (22%) | 8 (40%)    | 3 (18%)     | 3 (15%)     | 2 (12%) |
| 70-<80%             | 11 (15%) | 2 (10%)    | 4 (24%)     | 3 (15%)     | 2 (12%) |
| <70%                | 9 (12%)  | 3 (15%)    | 2 (12%)     | 3 (15%)     | 1 (6%)  |
| Range          | Above 120 mg/dL | Above 140 mg/dL | Above 160 mg/dL | Above 180 mg/dL |
|---------------|----------------|----------------|----------------|----------------|
|               | Median         | Median         | Median         | Median         |
|               | 5.6%           | 0.4%           | 0.0%           | 0.0%           |
| 0%            | 1 (1%)         | 29 (39%)       | 53 (72%)       | 64 (86%)       |
| >0 to <1%     | 9 (12%)        | 15 (20%)       | 11 (15%)       | 4 (5%)         |
| 1% to <5%     | 22 (30%)       | 20 (27%)       | 8 (11%)        | 5 (7%)         |
| 5% to <10%    | 24 (32%)       | 15 (22%)       | 1 (1%)         | 1 (1%)         |
| 10% to <15%   | 7 (9%)         | 1 (5%)         | 0.0%           | 0.0%           |
| ≥15%          | 11 (15%)       | 6 (30%)        | 11 (15%)       | 1 (5%)         |
| Above 140 mg/dL | Median         | Median         | Median         | Median         |
|               | 0%             | 29 (39%)       | 53 (72%)       | 64 (86%)       |
| >0 to <1%     | 15 (20%)       | 11 (15%)       | 4 (5%)         | 1 (1%)         |
| 1% to <5%     | 20 (27%)       | 8 (11%)        | 5 (7%)         | 1 (1%)         |
| 5% to <10%    | 4 (5%)         | 2 (10%)        | 1 (1%)         | 0.0%           |
| 10% to <15%   | 3 (4%)         | 2 (10%)        | 0.0%           | 0.0%           |
| ≥15%          | 11 (15%)       | 6 (30%)        | 11 (15%)       | 1 (5%)         |
| Above 160 mg/dL | Median         | Median         | Median         | Median         |
|               | 0%             | 53 (72%)       | 64 (86%)       | 64 (86%)       |
| >0 to <1%     | 11 (15%)       | 11 (15%)       | 4 (5%)         | 1 (1%)         |
| 1% to <5%     | 8 (11%)        | 5 (7%)         | 5 (7%)         | 1 (1%)         |
| 5% to <10%    | 1 (1%)         | 1 (5%)         | 1 (1%)         | 0.0%           |
| 10% to <15%   | 0.0%           | 0.0%           | 0.0%           | 0.0%           |
| ≥15%          | 11 (15%)       | 6 (30%)        | 11 (15%)       | 1 (5%)         |
| Above 180 mg/dL | Median         | Median         | Median         | Median         |
|               | 0%             | 64 (86%)       | 64 (86%)       | 64 (86%)       |
| >0 to <1%     | 4 (5%)         | 17 (25%)       | 14 (22%)       | 14 (22%)       |
| 1% to <5%     | 5 (7%)         | 1 (5%)         | 2 (12%)        | 2 (12%)        |
| 5% to <10%    | 1 (1%)         | 0.0%           | 1 (5%)         | 1 (5%)         |
Table A-3. Distribution of Glycemic Indices for Various Glucose Levels by Daytime vs. Nighttime (midnight-6 a.m.)

|                  | Overall N=74 | Time of Day |          |          |          |
|------------------|--------------|-------------|----------|----------|----------|
|                  | Daytime N=74 | Nighttime N=74 |          |          |          |
| Below 70mg/dL    |              |             |          |          |          |
| Median           | 1.7%         | 1.1%        | 2.2%     |          |          |
| A)0              | 21 (28%)     | 26 (35%)    | 32 (43%) |          |          |
| B)>0 to <1%      | 13 (18%)     | 10 (14%)    | 2 (3%)   |          |          |
| C)1% to <5%      | 17 (23%)     | 19 (26%)    | 15 (20%) |          |          |
| D)5% to <10%     | 11 (15%)     | 8 (11%)     | 4 (5%)   |          |          |
| E)10% to <15%    | 6 (8%)       | 3 (4%)      | 9 (12%)  |          |          |
| F)≥15%           | 6 (8%)       | 8 (11%)     | 12 (16%) |          |          |
| Below 60mg/dL    |              |             |          |          |          |
| Median           | 0.2%         | 0.0%        | 0.0%     |          |          |
| A)0              | 33 (45%)     | 40 (54%)    | 47 (64%) |          |          |
| B)>0 to <1%      | 18 (24%)     | 15 (20%)    | 4 (5%)   |          |          |
| C)1% to <5%      | 14 (19%)     | 15 (20%)    | 11 (15%) |          |          |
| D)5% to <10%     | 5 (7%)       | 1 (1%)      | 2 (3%)   |          |          |
| E)10% to <15%    | 3 (4%)       | 3 (4%)      | 6 (8%)   |          |          |
| F)≥15%           | 1 (1%)       | 0 (0)       | 4 (5%)   |          |          |
| Below 50mg/dL    |              |             |          |          |          |
| Median           | 0.0%         | 0.0%        | 0.0%     |          |          |
| A)0              | 49 (66%)     | 57 (77%)    | 58 (78%) |          |          |
| B)>0 to <1%      | 11 (15%)     | 6 (8%)      | 6 (8%)   |          |          |
| C)1% to <5%      | 12 (16%)     | 9 (12%)     | 3 (4%)   |          |          |
| D)5% to <10%     | 2 (3%)       | 2 (3%)      | 5 (7%)   |          |          |
| E)10% to <15%    | 0 (0)        | 0 (0)       | 2 (3%)   |          |          |
| Within 71-120 mg/dL |            |             |          |          |          |
| Median           | 91.0%        | 90.4%       | 90.3%    |          |          |
| A)0100%          | 0 (0%)       | 0 (0)       | 10 (14%) |          |          |
| B)95-<100%       | 14 (19%)     | 17 (23%)    | 22 (30%) |          |          |
| C)90-<95%        | 24 (32%)     | 21 (28%)    | 6 (8%)   |          |          |
| D)80%-<90%       | 16 (22%)     | 18 (24%)    | 12 (16%) |          |          |
| E)70-<80%        | 11 (15%)     | 10 (14%)    | 10 (14%) |          |          |
| F)<70%           | 9 (12%)      | 8 (11%)     | 14 (19%) |          |          |
| Above 120mg/dL   |              |             |          |          |          |
| Median           | 5.6%         | 5.9%        | 1.1%     |          |          |
| A)0              | 1 (1%)       | 2 (3%)      | 32 (43%) |          |          |
| B)>0 to <1%      | 9 (12%)      | 8 (11%)     | 5 (7%)   |          |          |
| C)1% to <5%      | 22 (30%)     | 20 (27%)    | 11 (15%) |          |          |
| D)5% to <10%     | 24 (32%)     | 24 (32%)    | 7 (9%)   |          |          |
| E)10% to <15%    | 7 (9%)       | 8 (11%)     | 5 (7%)   |          |          |
| F)≥15%           | 11 (15%)     | 12 (16%)    | 14 (19%) |          |          |
| Above 140mg/dL   |              |             |          |          |          |
| Median           | 0.4%         | 0.5%        | 0.0%     |          |          |
| A)0              | 29 (39%)     | 31 (42%)    | 58 (78%) |          |          |
| B)>0 to <1%      | 15 (20%)     | 13 (18%)    | 2 (3%)   |          |          |
| C)1% to <5%      | 20 (27%)     | 19 (26%)    | 7 (9%)   |          |          |
| D)5% to <10%     | 4 (5%)       | 6 (8%)      | 2 (3%)   |          |          |
| Time of Day | Overall N=74 | Daytime N=74 | Nighttime N=74 |
|-------------|--------------|--------------|----------------|
| **Above 160mg/dL** | | | |
| E)10% to <15% | 3 (4%) | 2 (3%) | 1 (1%) |
| F)≥15% | 3 (4%) | 3 (4%) | 4 (5%) |
| **Median** | 0.0% | 0.0% | 0.0% |
| A)0 | 53 (72%) | 54 (73%) | 68 (92%) |
| B)>0 to <1% | 11 (15%) | 9 (12%) | 0 |
| C)1% to <5% | 8 (11%) | 9 (12%) | 5 (7%) |
| D)5% to <10% | 1 (1%) | 1 (1%) | 0 |
| E)10% to <15% | 1 (1%) | 1 (1%) | 0 |
| F)≥15% | 0 0 | 0 0 | 1 (1%) |
| **Above 180mg/dL** | | | |
| **Median** | 0.0% | 0.0% | 0.0% |
| A)0 | 64 (86%) | 67 (91%) | 70 (95%) |
| B)>0 to <1% | 4 (5%) | 1 (1%) | 1 (1%) |
| C)1% to <5% | 5 (7%) | 6 (8%) | 2 (3%) |
| D)5% to <10% | 1 (1%) | 0 0 | 0 |
| F)≥15% | 0 0 | 0 0 | 1 (1%) |