A non-scientific Comparison of Dexcom G7 and Freestyle Libre 3 Plus Part 1

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1   Overview

Well, what is this short paper about? After I was diagnosed with Type 1 Diabetes early in 2019, my endocrinologist more or less immediately suggested that I should use all the technology that is available to support my blood glucose ("BG") management. So, I started using the G7 G6 in February 2019 and added a Tandem t-slim insulin pump in September 2019. I upgraded to the Dexcom G7 soon after it was released and of course upgraded my pump to the Control IQ system as soon as it was available.

All the time, I followed advances of diabetes technology– new pumps, new CGMs, more compatibility and so on. Recently, I learned that the latest version of Abbott's CGM – the Freestyle Libre 3 Plus – is compatible with my t-slim pump as well as with the twiist, a newer pump that incorporates the open-source Loop algorithm. So, I started to think, maybe it's time to update my diabetes management.

To prepare for this, my plan is to test what I am going to do: In the first step, I want to find out how the Libre 3 Plus compares with the G7. In a second step, I want to connect the Libre with my pump. And the final step would be to try the twiist pump connected with the Libre. That is assuming that the initial steps tell me this move could bring a positive change.

This document describes the initial test, i.e., my first comparison of the Libre 3 Plus with the Dexcom G7. I want to emphasize that this is not a scientific study, it's only one person and one sensor session. Everybody knows that diabetes is a very individual disease and results for one person will likely not apply to every other person. However, because the collected data clearly shows a trend, I want to share this, maybe my results will help others to do their own research and at the end make more informed decisions.

2   The Setup

The setup for my 'study' was very simple.

- I decided to collect data for a 15-day period because the Libre 3 Plus sensor is supposed to last for 15 days. For data analysis I used only full days, that is why my study period is 14 days.
- Note that I checked the Serial Number of the Libre 3 Plus sensor that I used (S/N "0JQRKFUUK") against the website https://www.freestylecheck.com/us-en/product-lookup.html to ensure that the sensor was not impacted by the recent FDA warning.
- Because the Dexcom G7 lasts 10 days, I had to use two sensors during the study period. As shown below, the Libre 3 Plus sensor was applied and started a few days into the session of the first G7 sensor.

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Dexcom G7 (1. Sensor)	■	■	■	■	■	■	■	■												
Dexcom G7 (2. Sensor)									■	■	■	■	■	■	■	■				
Freestyle Libre 3 Plus			■	■	■	■	■	■	■	■	■	■	■	■	■					

- Because I wanted to focus on the comparison of CGM measurements, I did not make any change to the setup for my Tandem pump – it was paired with the G7 during the whole period as usual.
- Note that for personal reasons both CGM sensors were inserted at the abdomen, not the suggested and officially approved location on the arm.
- In addition to recording data from both CGMs using the respective iPhone app ("Dexcom G7" and "Libre 3"), I used a "Contour next EZ" BG meter with "Contour next" test strips to measure the BG value at least twice a day.
- As usual for me, I did not calibrate the G7 using BGM values except during the hours after insertion of the second sensor.

3 Some Data Analysis on Collected Data

During the 15-day period, three datasets were collected and analyzed for this paper.

- The G7 and Libre Datasets
  At the end of the 15-day period I downloaded the recorded data from both CGM's websites.
- A BGM, G7, and Libre Dataset
  I measured and recorded my blood glucose value twice a day (typically in the morning and late afternoon) using the blood glucose meter and recorded at the same time the values measured and reported by the G7 and the Libre 3 Plus.

3.1 G7 and Libre Datasets

These datasets contain all BG values that were measured and recorded by the respective CGM. They were analyzed by calculating some statistics such as minimum and maximum, mean values and standard deviation per day and overall. The results are listed on the table in the appendix section 6.1. Using the mean value and standard deviation, the distribution of measured BG values was calculated and is shown in the graph below.
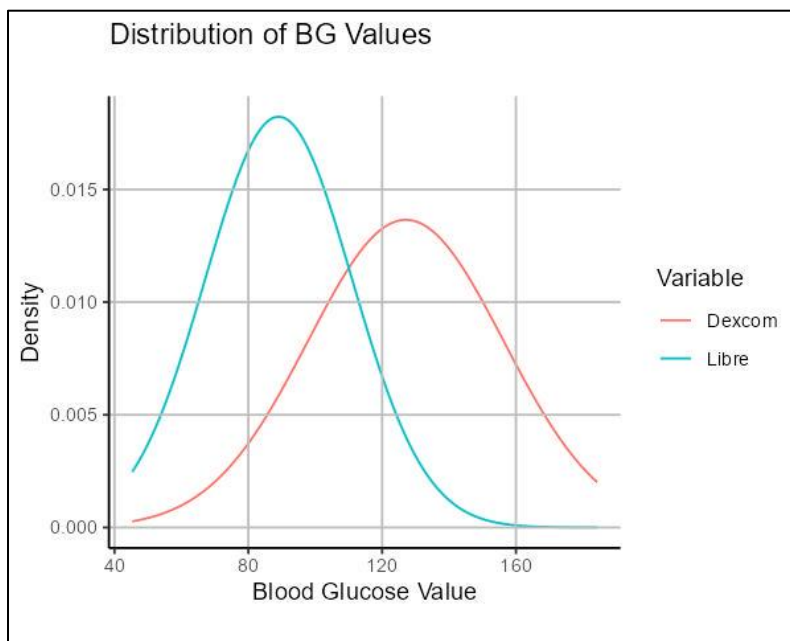

Here are some specific observations with respect to these datasets:

- The average BG value measured by the Libre was 89.1 mg/dL and nearly 40 mg/dL lower than the average value measured by the Decom 127.1 mg/dL. See the next section for a comparison with measurement with a BG meter.
- The standard deviation for Libre data was 21.9 mg/dL versus 29.2 mg/dL for the G7. This means that about 68% of Libre-measured BG values were between 67 mg/dL and 111 mg/dL. The corresponding interval for G7-measured values is 89 mg/dL to 156 mg/dL and significantly larger.
- Looking at minimal and maximal values during the 14-day period, I suggest ignoring the very low G7 value on Nov-24 as this was one of the typical erratic G7 measurements after inserting a new sensor. The most significant observation is the rather high maximal BG value that the G7 measured (222 mg/dL) compared to the Libre.

3.2   A BGM, G7, and Libre Dataset

This dataset contains all BG values that were measured and recorded at least twice a day using the blood glucose meter and both CGMs. The data are plotted below using a ("meaningless") smooth line to connect the individual measurements.
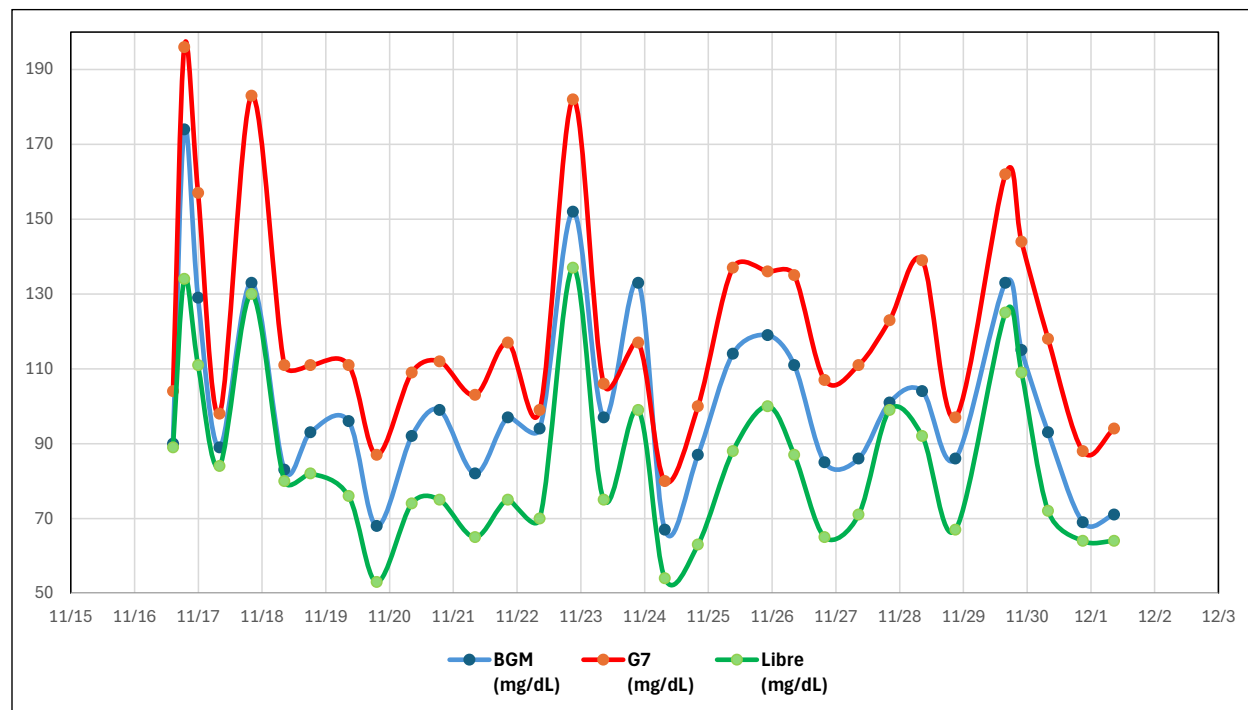
All data and some statistics are listed on the table in section 6.2 of this paper. Note that according to the manufacturer's information the first 12 hours of data for the Libre are not reliable and should be considered with caution. The graph below shows the distribution of measured BG values around the mean value for the BGM and both CGMs in comparison.

Distribution of BG Values
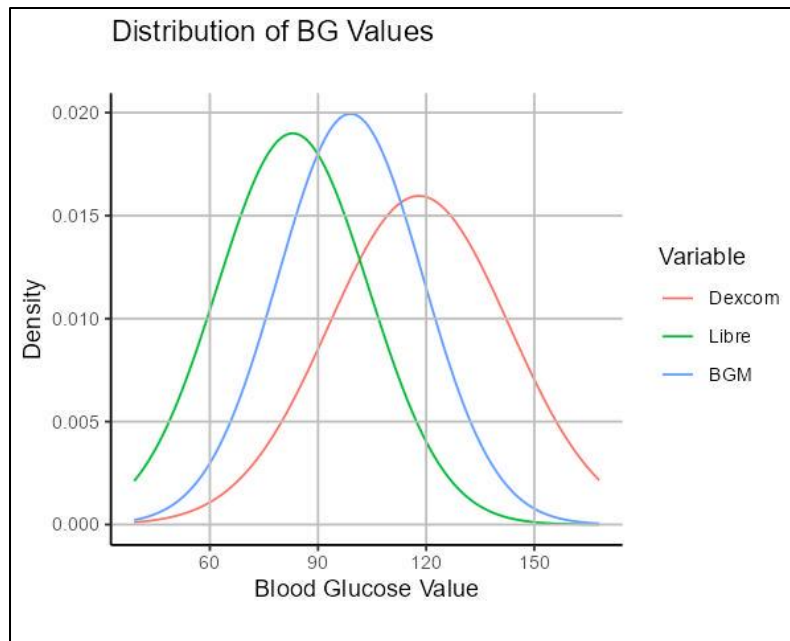
Compared to the complete datasets for the CGMs, the data in this dataset allows the comparison of CGM measurements with the BGM-measured BG values, which often are considered to be the 'correct' BG values. Just to be clear, the following comments take the BGM value as the correct value and considers the difference between the BGM value and the CGM as deviation or an "error"[1].

- It is not surprising that the average for Libre-measured values is lower than the average for the G7 as this mirrors the results from the complete datasets. But it is noteworthy that the BGM values are consistently between these two, i.e., the Libre nearly always measured BG values too low and the G7 measured too high. The only exception was a measurement after the insertion of the second G7 sensor – marked with blue cells in the table in section 6.2.
- The average of the absolute difference between BGM- and Libre-measured values was 16 mg/dL with a standard deviation of 8.2 mg/dL. This was a little better than for the G7 measured values with an average error of 20.6 mg/dL and a standard deviation of 9.2 mg/dL.

4   Additional Observations, Conclusions, and Questions

The following comments focus on the Libre 3 Plus and the differences observed with respect to the G7.

- The Libre worked without issues during the whole period, i.e., no connectivity issues were encountered. Even the 12 hour start-up period (as described by the manufacturer) where the values should be considered as unreliable was not an problem because the values were somewhat in the same range as the G7 values.
- I encountered more 'low alerts' from the Libre than I liked. As explained previously, the BGM dataset showed that the measured values were in average about 35 mg/dL lower than the G7-measured values that my pump (i.e., the Control IQ system) used to control my BG level. So, in most cases, I concluded even during the test that the low alerts from the Libre could be ignored. Though they

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[1] I am well aware that this view is not exactly correct, but after all, this is not a scientific study to begin with.

were still somewhat annoying, aggravated by the fact that the Libre app on the phone would not allow me to completely silence the alerts.

- As mentioned before, both sensors were applied at the abdomen, though both are officially approved for application on the arm. I wonder if the values would be closer to the BGM values if I had applied them on the arm as approved by the manufacturer. More specifically, I wonder if the systematically "lower-than-BGM" measurements of the Libre would have been different.

- Conclusions and Questions

  - I believe that a second test is warranted: I will apply a Libre 3 Plus at the arm and measure the same type of data over a second 15-day period.
    See what that gives me …

  - Because of the rather high average difference between the BGM-measured values and the CGM values, I think the next test needs to be done with some additional caution. To reduce the effect of the difference between blood glucose measurement (using the blood glucose meter) and interstitial fluid measurements (used by the CGMs), the BGM measurements should be taken when the blood sugar level is rather stable. This should be easy to achieve because both CGMs show the trend of the BG values using an arrow in addition to showing the current value.

  - Finally, I wonder what it would mean for my BG management if the Libre values are really consistently lower than the G7 values: I believe that if my pump uses lower BG values as input for the Control IQ system, it will inevitably give me less insulin, which in turn would increase my blood sugar level.
    At the moment, I don't think I like that …

- Two additional side notes:

  - Both apps on the phone calculate the so-called GMI [%] ("Glucose Management Indicator") which is supposedly an approximation for the HbA1c value. The fact that the BGM-measured values were consistently lower than the G7 values might explain why my HbA1c is typically a little lower that the GMI calculated by the G7 app.

  - Not a data issue, but worth to mention: It seems that with this one application of the Libre sensor, I had fewer skin irritation than I typically experience with the G7 sensor. This could be an additional benefit for me.

5   References

1. https://www.G7.com/, accessed on 11/24/2025
2. https://www.tandemdiabetes.com/, accessed on 11/24/2025
3. https://www.freestyle.abbott/us-en/products/freestyle-libre-3.html, accessed on 11/24/2025
4. https://www.twiist.com/, accessed on 11/24/2025

6 Appendix: Data Tables

6.1 Statistics of G7 and Libre Data – By Day and Total for 14 Day Period

- All measured and calculated data are in mg/dL.

Date	Min G7	Min Libre	Mean G7	SD G7	Mean Libre	SD Libre	Max G7	Max Libre
17-Nov	91	66	127.4	21.4	91.5	16.8	183	136
18-Nov	86	63	122.5	20.8	85.9	14.4	176	112
19-Nov	83	54	130	24.4	88.3	17.8	186	129
20-Nov	77	55	124.6	26.3	81.9	18.9	207	145
21-Nov	72	53	124.1	35.1	83.7	26.1	215	153
22-Nov	86	61	133	35.1	94.7	27.5	205	155
23-Nov	92	66	125.1	22.7	95.6	19.1	195	147
24-Nov	39	53	114.8	36.3	89.2	26	208	145
25-Nov	77	54	128.1	23	91.2	18.6	182	137
26-Nov	83	58	123.7	21.5	84.8	18.5	163	123
27-Nov	64	53	139.8	37.6	96.2	26.8	206	149
28-Nov	77	55	121.5	27.4	84.1	19.7	197	146
29-Nov	74	55	140	32.6	96.9	25.3	222	159
30-Nov	79	59	124.2	26	82.9	17	181	119
Total	**39**	**53**	**127.1**	**29.2**	**89.1**	**21.9**	**222**	**159**

6.2 Dataset with BGM, G7, and Libre Data

- All measured and calculated data are in mg/dL.
- Two BGM measurements that were used for calibrating the second G7 sensor on Nov-23 and Nov-24 were omitted.

Date	Time	BGM	G7	Libre	Abs. Difference G7/BGM	Abs. Difference Libre/BGM
17-Nov	8:00 AM	89	98	84	9	5
17-Nov	8:05 PM	133	183	130	50	3
18-Nov	8:24 AM	83	111	80	28	3
18-Nov	6:11 PM	93	111	82	18	11
19-Nov	8:34 AM	96	111	76	15	20

Date	Time	BGM	G7	Libre	Abs. Difference G7/BGM	Abs. Difference Libre/BGM
19-Nov	7:10 PM	68	87	53	19	15
20-Nov	8:20 AM	92	109	74	17	18
20-Nov	6:49 PM	99	112	75	13	24
21-Nov	8:08 AM	82	103	65	21	17
21-Nov	8:32 PM	97	117	75	20	22
22-Nov	8:31 AM	94	99	70	5	24
22-Nov	9:03 PM	152	182	137	30	15
23-Nov	8:34 AM	97	106	75	9	22
23-Nov	9:36 PM	133	117	99	16	34
24-Nov	7:35 AM	67	80	54	13	13
24-Nov	8:05 PM	87	100	63	13	24
25-Nov	9:11 AM	114	137	88	23	26
25-Nov	10:20 PM	119	136	100	17	19
26-Nov	8:19 AM	111	135	87	24	24
26-Nov	7:45 PM	85	107	65	22	20
27-Nov	8:33 AM	86	111	71	25	15
27-Nov	8:11 PM	101	123	99	22	2
28-Nov	8:29 AM	104	139	92	35	12
28-Nov	9:00 PM	86	97	67	11	19
29-Nov	3:48 PM	133	162	125	29	8
29-Nov	9:50 PM	115	144	109	29	6
30-Nov	7:51 AM	93	118	72	25	21
30-Nov	9:25 PM	69	88	64	19	5
Min		**67**	**80**	**53**	**5**	**2**
Mean		**99.2**	**118.7**	**83.2**	**20.6**	**16**
Standard Deviation		**20.8**	**25.8**	**21.7**	**9.2**	**8.2**
Median		**95**	**111**	**75.5**	**19.5**	**17.5**
Max		**152**	**183**	**137**	**50**	**34**