# Interpreting the Results
BTrackS™ Balance Test (BBT) and Fall Risk Assessment (FRA)

BTrackS is a computerized balance assessment system that provides an objective, accurate and reliable measure of an individual's postural sway. Postural Sway is a known indicator of balance ability and is commonly used in fall risk assessment. The BTrackS Balance Test (BBT) is the standard testing protocol implemented by the BTrackS Assess Balance Software. After an individual is tested on BTrackS, there are five results available for interpretation.
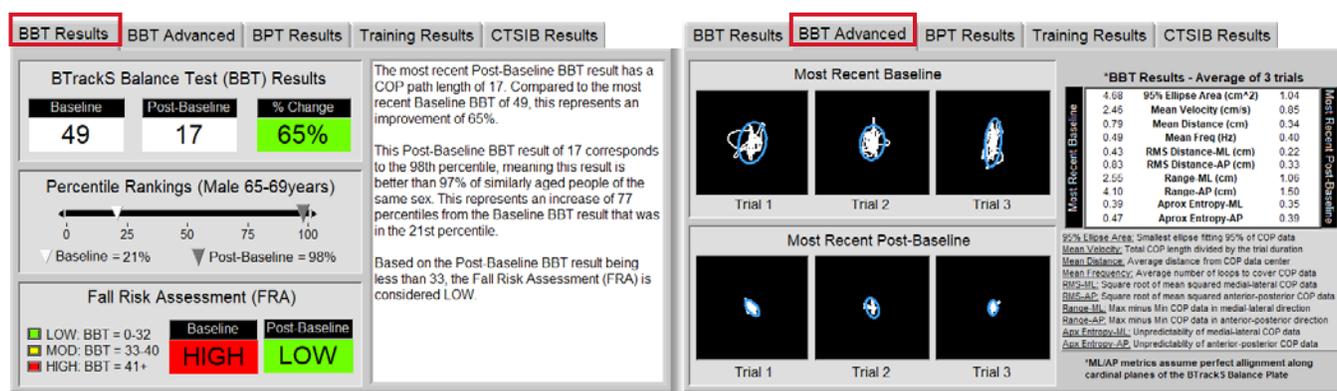
Results screens for the BBT.

This example shows a Baseline of 49, a Post-Baseline of 17 and a 65% Change (from 49 to 17)
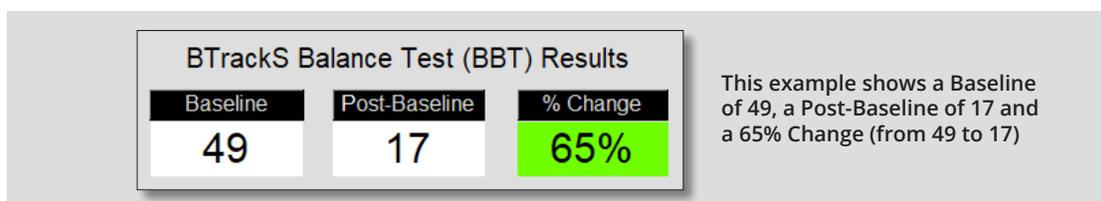
❶ The Baseline BBT Result

This is the result for the most recent Baseline BBT given to the individual tested. The majority of individuals will only have one Baseline BBT, but there are some occasions where a second or third baseline may be utilized. The Baseline BBT typically ranges from 10cm to 75cm, but can be as high as 100+cm and as low as 7cm.

❷ The Post-Baseline BBT Result and Percent Change

This is the most recent Post-Baseline BBT result. If this says N/A, then the Baseline BBT is the only result available for this individual. In some cases, there can be multiple post baseline BBT's – but only the most recent is shown here. The box labeled % Change compares the Post-Baseline BBT to the Baseline BBT. If it is green, the change is positive (less sway). If it is red, the change is negative (more sway).

Post-Baseline BBT's are utilized to measure ongoing BBT results. This is common in the Health and Wellness industries where specific programs are available to try and improve balance. This is also utilized in return-from-injury measurements where Athletic Trainers or Health Clinicians want to measure postural sway as a component of their treatment program.

With this in mind, if this BTrackS System is being used to track individuals who are looking to measure their results over time, please review the information in the box below. This will provide guidance on how to interpret BBT results and determine when postural sway has truly been improved.

(!) IMPORTANT: How to know if an individual is really improving their postural sway?

Balance and postural sway are likely to change on a daily basis due to mood, stress, fatigue, food, medicine and other factors. Research conducted by Balance Tracking Systems shows that BBT variance of up to 5 centimeters can occur due to these factors. So, an individual with a Baseline BBT of 44 may retest at 40 or 48 and they haven't truly improved or declined. Improvements in BBT results should be evaluated as *consistently performing at least 5cm better than baseline over time*. See the two examples below:

Example 1: A 73-year-old individual with a Baseline BBT of 44 may, over time, get results like 44, 42, 46, 43,

42, 38, 39, 36, 34, 37, 35, 38, 35, 33. This demonstrates true improvement. The individual has moved their result more than 5cm from the mid-40's to the mid-30's.

Example 2: A 73-year-old individual with a Baseline BBT of 38 may, over time, get results like 38, 35, 40,43, 38, 36, 41, 36, 40, 38, 40, 36, 37, 36. This demonstrates no real improvement. This individual is consistently performing within 5 centimeters of their Baseline. Some individuals will end up in this model and the key for them is that they are remaining at a consistent level and not getting worse.

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③ Percentile Ranking

This is where the software utilizes the BTrackS BBT Normative Database to compare each individual to others of a similar age and sex. BBT results from over 17,000 individuals make up the database. The scale, from 0 on the left to 100 on the right, represents the percentile ranking of the BBT. The white marker is the Baseline measurement and the gray marker is the most recent Post-Baseline measurement. In the example below, the Baseline is 21% and the Post Baseline is 98%. This can be described as – "A BBT in the 21st percentile is better than 20% of similarly aged people of the same sex." The Comparison to Age Group is provided to allow individuals to have an understanding of how they compare to others their own age and sex, which can provide an incentive to improve or maintain their BBT result.
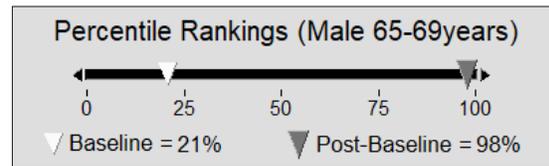

This example shows a Baseline BBT in the 21st percentile and the Post-Baseline BBT in the 98th percentile. This is an improvement of 77 percentiles.

④ Fall Risk Assessment (FRA)

The BTrackS Fall Risk Assessment (FRA) categorizes an individual's fall risk as either Low, Moderate or High. While this assessment is calculated for each individual – it is most useful for adults aged 60 and above, where the consequences of a fall are amplified do to deterioration of the body and comorbidities. The assessment is determined by comparing the individual's BBT to the average BBT of an adult aged 20-39. Adults aged 20-39 are not considered fall-risk candidates and after testing thousands of individuals in this age range - it is possible to calculate a statistical average – which is 22cm for women and 24cm for men.

A Fall Risk Assessment of **LOW** is provided when the BBT is less than or equal to one standard deviation (8cm) above the average. This means a BBT result between 0cm and 30cm

has a LOW FRA for women, and a BBT result between 0cm and 32cm is a LOW FRA for men. A FRA of **MODERATE** is then provided when the BBT is between 1 and 2 standard deviations above the average (31-38cm for women; 33-40cm for men) and an FRA of **HIGH** is provided when the BBT is greater than 2 standard deviations above the average (39+cm for women; 41+cm for men).
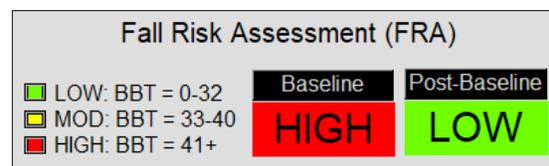
This example shows the FRA was HIGH for the Baseline and LOW for the Post-Baseline.

After each BBT, the individual is provided with a fall risk assessment of **Low** (green), **Moderate** (yellow) or **High** (red). The tables below show male and female BBT normative data results for all age groups and illustrates two well-documented population statistics – about 50% of individuals over age 80 have high fall risk and about 25% of individuals at age 65 have high fall risk.

The BTrackS™ Fall Risk Assessment (FRA) categorizes an individual's fall risk as either *Low, Moderate* or *High*.

MALE

	Age 60-64	Age 65-69	Age 70-74	Age 75-79	Age 80+
100%	12	10	5	13	16
95%	20	19	19	20	23
90%	23	21	21	23	25
85%	24	22	25	26	28
80%	25	23	26	28	31
75%	26	26	29	29	33
70%	28	27	31	33	36
65%	29	29	31	33	38
60%	30	30	33	36	43
55%	30	31	35	37	46
50%	32	33	37	39	48
45%	33	35	39	41	50
40%	34	36	44	43	54
35%	37	40	45	47	60
30%	38	42	48	56	66
25%	41	45	50	62	72
20%	43	49	55	70	79
15%	48	56	63	78	88
10%	54	64	74	83	98
5%	65	79	99	119	107
0	317	249	210	146	233

FEMALE

	Age 60-64	Age 65-69	Age 70-74	Age 75-79	Age 80+
100%	9	9	9	13	11
95%	15	16	16	18	18
90%	17	18	19	20	20
85%	19	20	20	22	22
80%	20	21	22	24	24
75%	21	22	23	25	28
70%	22	23	24	27	30
65%	23	24	26	28	32
60%	25	25	27	30	33
55%	25	27	27	31	36
50%	27	29	29	33	38
45%	28	30	31	35	40
40%	29	31	32	38	43
35%	31	33	34	40	47
30%	33	35	37	43	51
25%	34	37	39	46	56
20%	36	40	42	51	60
15%	39	44	48	56	69
10%	43	49	55	62	78
5%	49	62	69	78	100
0	100	170	165	581	212

! IMPORTANT

There are many risk factors that contribute to falling and while balance is critical, others such as age, medications, vision, overall weakness and dizziness. An FRA of **LOW** does not mean a person cannot fall and an FRA of **HIGH** does not mean a person will fall.

⑤ Advanced Metrics

There are 10 additional measurements provided for analyzing Center-of-Pressure (COP) along with some additional visualizations. The visualizations provide a close-up inspection of the path length trace with an overlay of the 95% Ellipse Area on top of the trace. The Ellipse Area is the smallest ellipse that fits 95% of the COP trace and its direction can be informative of certain impairment conditions.

95% ellipse and list of advance metrics.

All these additional metrics are provided for Health and Wellness Professionals who would like to analyze the COP trace in detail. The metrics are provided with descriptions, but Balance Tracking does not draw conclusions or provide normative data based on the metrics. The Metrics are:

Ten Additional Advanced Metrics

1. **95% Ellipse Area:** Smallest ellipse fitting 95% of COP data
2. **Mean Velocity:** Total COP length divided by the trial duration
3. **Mean Distance:** Average distance from COP data center
4. **Mean Frequency:** Average number of loops to cover COP data
5. **RMS-ML:** Square root of mean squared medial-lateral COP data
6. **RMS-AP:** Square root of mean squared anterior-posterior COP data
7. **Range-ML:** Max minus Min COP data in medial-lateral direction
8. **Range-AP:** Max minus Min COP data in anterior-posterior direction
9. **Approximate Entropy-ML:** Unpredictability of medial-lateral COP data
10. **Approximate Entropy-AP:** Unpredictability of anterior-posterior COP data

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