# Sustained knee flexion force (hamstrings), with and without Q-Technology

*Instrumented pilot study (athlete, anonymized subject) — when the weak side finally holds the distance*

**Level of evidence :** Observed in-house — pilot study (n = 1), documented circuit (Q-Alpha), confirmed by a robustness check (mean of 3 trials)

| | |
|---|---|
| **Study type** | Exploratory pilot, within-subject, paired comparison without Q vs with Q |
| **Participant** | An athlete (anonymized subject) |
| **Device** | Kinvent Physio dynamometer (ref. M124240), 500 Hz sampling |
| **Movement** | Knee flexion at 90°, lying down — hamstrings |
| **Q circuit** | Q-Alpha |
| **Task** | Maximal voluntary isometric contraction — 3 trials/condition, best of 3 retained |
| **Conditions** | Without Q circuit, then with Q-Alpha — same session, ~9 min apart |
| **Outcomes kept** | Peak force and sustained (mean) force per side · asymmetry |


### Summary

Sixth measurement in the Kinvent series, in knee flexion (hamstrings), documented Q-Alpha circuit. On peak force, the weak side (left) rises more than the strong one (+18% vs +11%) and the gap narrows (12.5 → 6.9%). But it is on SUSTAINED force (mean) that the effect is clearest: the weak side goes from 13.4 to 17.1 kg (+28%) and aligns with the strong side — the sustained-force asymmetry vanishes, from 24.1% to 0.3%. Confirmed on the mean of the three trials. Exploratory result on a single subject, to be replicated.


## 1. Background and objective

Previous measurements looked mainly at peak force — who pushes hardest, for a fraction of a second. This case adds a complementary reading: sustained force (the mean force held during the effort), which matters just as much in real sporting movement — sprinting, decelerating, repeated support.

The question: the weak side, which catches up on peak, does it also hold the distance? The answer here is clearer over duration than on peak.

## 2. Method

Standardized protocol, instrument-read measurements:

- Participant: an athlete (anonymized subject), one measurement per condition.
- Device: Kinvent Physio dynamometer (ref. M124240), 500 Hz.
- Movement: knee flexion at 90°, lying down — hamstrings.
- Task: maximal voluntary isometric contraction (MVC) against the dynamometer.
- Q circuit: Q-Alpha (documented).
- Repetitions: 3 per condition; best of 3 retained, and mean of 3 computed as a control.
- Conditions: without Q circuit, then with Q-Alpha — fixed order, same session, ~9 min apart.

- Outcomes kept: peak force and sustained (mean) force per side, asymmetry. Velocity metrics (RFD, time to peak) discarded as too noisy.

## 3. Results

**OBSERVATION** Weak-side catch-up on peak, and above all on sustained force — measured on the instrument.

| Measure (Kinvent) | Without Q | With Q-Alpha | Reading |
|---|---|---|---|
| **Peak force — left (weak side)** | 17.0 kg | **20.1 kg** | +18% |
| Peak force — right (strong side) | 19.5 kg | 21.6 kg | +11% |
| **Peak-force asymmetry** | 12.5% | **6.9%** | ~halved |
| **Sustained (mean) force — left** | 13.4 kg | **17.1 kg** | +28% |
| Sustained (mean) force — right | 17.7 kg | 17.2 kg | stable |
| **Sustained-force asymmetry** | 24.1% | **0.3%** | vanishes |

Two readings, two intensities. On peak force, the weak side (left) gains +18% and closes on the strong one, which rises +11%; the peak gap goes from 12.5% to 6.9%. Consistent with the rest of the series, without being spectacular.

On sustained force — the mean force held during the effort — the effect is far more pronounced. That is the subject of the next section.

## 4. Peak isn’t the whole story — sustained force

Peak measures a fraction of a second: who pushes hardest, for an instant. Sustained force measures something else — the ability to hold the effort without collapsing. In real sporting movement, it is often this quality that makes the difference.

And this is exactly where this case is clearest. Without Q, on mean force, the weak side was far behind: a 24.1% gap with the strong side. It pushed adequately at first, then dropped off. With Q-Alpha, the two sides align almost perfectly (17.1 vs 17.2 kg): the sustained-force asymmetry falls to 0.3%.

In other words, the weak side no longer settles for a peak — it now holds the distance like the strong side. This is the quality a lagging limb most often lacks, and it is the one that moves the most here.

## 5. Robustness check

The Kinvent summary keeps only the best of the three trials. Recomputed on the mean of the three, the peak confirms the same direction:

| Measure (peak) | Best of 3 | Mean of 3 |
|---|---|---|
| Left (weak side) | +18% | +25% |
| Right (strong side) | +11% | +9% |
| Peak asymmetry | 12.5 → 6.9% | ~13 → ~0.5% |

Same direction on both readings: the weak side rises most, asymmetry closes. It is therefore not a best-trial selection artifact.

As in the previous flexion measurement, the velocity metrics (RFD, time to peak) were too noisy in this session; they are not retained. The analysis is limited to force (peak and sustained) and symmetry.

## 6. Convergence and scope

The value of this case is not the size of any single figure, but the convergence: peak and sustained force point the same way, the weak side catches up, and it is over duration that the rebalancing is most complete.

The scope remains that of a demonstration: one subject, one joint, one session. No prevention or generalizable performance promise is drawn from a single case. An objectively measured asymmetry reduction, yes; a population conclusion, no.

## 7. Limitations

- n = 1, one measurement per condition (best of 3, corroborated by the mean of 3).
- Fixed order (without then with), same session ~9 min apart; non-blinded condition, no sham circuit.
- Velocity metrics (RFD, time to peak) discarded as too noisy; analysis limited to force and symmetry.

## 8. Next steps

- Repeat with alternating order and a sham circuit placed by a third party (blinded).
- Check whether the sustained-force effect repeats in other subjects.
- Compare peak vs sustained force on other muscles and joints.
- Extend to several subjects.

## 9. Conclusion

Sixth case, in flexion (hamstrings), Q-Alpha circuit: the weak side catches up on peak, but above all on sustained force, where asymmetry goes from 24.1% to 0.3%. The peak/duration distinction is the added value of this measurement: not just a surge, but a held force that rebalances. Confirmed on the mean of the trials. It remains to be confirmed blinded and across several subjects. Framing: an exploratory pilot study, to be replicated, with no medical claim.

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*Source: Kinvent Physio report (M124240, 500 Hz), knee flexion 90° (lying), Q-Alpha circuit, best of 3 trials (corroborated by the mean of 3). Anonymized subject. Unaudited internal data. Not a medical claim.*