Knee flexion force (hamstrings), with and without Q-Technology

Instrumented pilot study (subject Élodie) — the first test on a different muscle chain

Level of evidence : Observed in-house — pilot study (n = 1), first flexion test (hamstrings), confirmed by a robustness check (mean of 3 trials)

Study type	Exploratory pilot, within-subject, paired comparison without Q vs with Q
Participant	One adult subject (Élodie), one session
Device	Kinvent Physio dynamometer (ref. M124240), 500 Hz sampling
Movement	Knee flexion at 90°, lying down — engages the hamstrings
Task	Maximal voluntary isometric contraction — 3 trials/condition, best of 3 retained
Conditions	Without Q circuit (6:07 p.m.), then with Q circuit (6:15 p.m.) — same session, ~8 min apart
Outcomes kept	Peak force per side · asymmetry (velocity discarded as too noisy)

Summary

Fifth measurement in the Kinvent series, and the first in knee FLEXION (hamstrings) — a different muscle group from the previous extension tests (quadriceps). The pattern repeats: force rises mostly on the WEAK side (+27% on the left, versus +9% on the right, already strong). Peak-force asymmetry drops from 11.2% to 2.2% (~5× lower); mean asymmetry, already negligible, stays so. Confirmed on the mean of the three trials. Velocity metrics (RFD) being too noisy here, the analysis is limited to force and symmetry. Exploratory result on a single subject, to be replicated.

1. Background and objective

The first measurements in the series were on knee extension (quadriceps) and showed an effect that goes first to the weak side. The question here: does that pattern hold on a different muscle chain? Knee flexion isolates the hamstrings — a different group, recruited in sprints, decelerations and changes of direction.

The answer is clear: on this new muscle too, the weak side rises most and the gap closes.

2. Method

Standardized protocol, instrument-read measurements:

- Participant: one adult subject (Élodie), a single session.
- Device: Kinvent Physio dynamometer (ref. M124240), 500 Hz.
- Movement: knee flexion at 90°, lying down — engages the hamstrings.
- Task: maximal voluntary isometric contraction (MVC) against the dynamometer.
- Repetitions: 3 per condition; best of 3 retained, and mean of 3 computed as a control.
- Conditions: without Q circuit (6:07 p.m.), then with Q circuit (6:15 p.m.) — fixed order, same session, ~8 min apart.
- Outcomes kept: peak force (L, R), mean force, asymmetry. Velocity metrics (RFD, time to peak) were discarded as too noisy (see §5).
- Note: the exact Q circuit was not recorded on the export.

3. Results

OBSERVATION Force increase concentrated on the weak side, and asymmetry reduction — measured on the instrument.

Measure (Kinvent, best of 3)	Without Q	With Q	Reading
Peak force — left (weak side)	8.5 kg	**10.8 kg**	+27%
Peak force — right (strong side)	9.6 kg	10.5 kg	+9%
Peak-force asymmetry	11.2%	**2.2%**	~5× lower
Mean force — left / right	7.5 / 7.4 kg	9.2 / 9.3 kg	rises
Mean-force asymmetry	1.9%	0.3%	already negligible

Peak force rises mostly on the weak side: +27% on the left (8.5 → 10.8 kg), while the already-strong side rises three times less (+9% on the right, 9.6 → 10.5 kg). The lagging side catches up to the other.

On peak force, asymmetry falls from 11.2% to 2.2% — about fivefold. On mean force, the gap was already negligible (1.9%) and stays so (0.3%): there was nothing to correct. Absolute forces are low (8–11 kg), which is normal for a lying knee flexion.

4. The same pattern — on a new muscle

The striking point: this is the first flexion test (hamstrings), and the pattern seen on the previous extensions (quadriceps) recurs. The gain concentrates on the weak side, the strong side rises little, the gap closes. The effect therefore does not seem specific to one muscle chain: it behaves the same way on a different group.

It is also, indirectly, a safeguard: a general amplification would have raised both sides equally. Here again, it is the weak link that responds most.

5. Robustness check and discarded data

Two rigor checks — what we confirm, and what we discard:

Side	Best of 3	Mean of 3
Left (weak side)	+27%	+34%
Right (strong side)	+9%	+11%
Peak asymmetry	11.2 → 2.2%	~13 → ~4%

Robustness first: the Kinvent summary keeps only the best trial. Recomputed on the mean of the three trials, the result goes in the same direction (weak side +34%, strong side +11%, asymmetry from ~13% to ~4%). It is therefore not a best-trial selection artifact.

Honesty about what we do not keep, next: the velocity metrics (RFD, time to peak) were too noisy here to interpret — one side shows an RFD of zero, likely a measurement artifact. Rather than dress them up, we discard them. The analysis is limited to force and symmetry, which are clean.

6. What it means — and what it does not

To place it correctly: hamstring force asymmetry is a marker that sports medicine monitors, notably when clearing a return to play after injury. A gap beyond roughly ten percent is typically the kind of figure one seeks to reduce.

What we show here: an objectively measured asymmetry reduction, on the hamstrings, in a single session. What we do NOT say: that it “prevents injuries.” Such a claim would require longitudinal follow-up and many subjects. One case is a demonstration, not proof — and we state it plainly.

7. Limitations

- n = 1, one measurement per condition (best of 3, corroborated by the mean of 3).
- Fixed order (without then with), same session ~8 min apart; non-blinded condition, no sham circuit.
- Velocity metrics (RFD, time to peak) discarded as too noisy; analysis limited to force and symmetry.
- Q circuit not recorded on the export — to be documented so circuits can be compared across subjects.

8. Next steps

- Repeat with alternating order and a sham circuit placed by a third party (blinded).
- Record the circuit used (Alpha / Theta / Omega).
- Compare flexion vs extension in the same subject, to see whether the effect is as clear on both chains.
- Extend to several subjects.

9. Conclusion

Fifth case, first flexion, same direction: on the hamstrings as on the quadriceps, force rises mostly on the weak side and peak asymmetry collapses — confirmed on the mean of the trials. That the pattern holds across two different muscle chains is an encouraging signal for the consistency of the series. It remains to be confirmed blinded and across several subjects, and not to be over-read: an objectively measured asymmetry reduction, yes; a prevention promise, no. Framing: an exploratory pilot study, to be replicated, with no medical claim.

Nicolas Desjardins · DBA(c) · PhD(c) IMD · MSc in Neuroscience (in progress) — Q-Technology OÜ, Narva mnt 5, 10117 Tallinn, Estonia

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