



# DUAL TASK GAIT TEST AND GAIT REHABILITATION IN THE ELDERLY

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## Objective:

Gait rehabilitation in the elderly is usually focused on motor function. Recently complex motor-cognitive training has been reported the most efficient method to improve gait rehabilitation [1]. The rationale is based on the inter-relationship between motor function and cognition such as attention, working memory and executive function [2]. This inter-relationship can be assessed by the dual-task gait test (DTGT). The aim of this study was to investigate the effect of a DTGT in an elderly gait outpatient consultation

## Method:

### Single and Dual Task Gait Test

- Patient (equipped with the Locometrix system) has to walk at his self selected speed in a straight corridor without any obstacle
- Gait test is called **Single task** condition when no additional task was performed by the patient
- Gait test is called **Dual task** condition when an additional attention task was performed by the patient



Data was collected from an outpatient consultation dedicated to gait instability in elderly people. The consultation included a DTGT.

### Gait Analysis System : Locometrix

- Ambulatory conditions
- No specific equipment
- Accurate reproducibility
- Reliable and sensitive
- Gait variable of clinical interest
- Results immediately available



Fifty six patients were tested (F: 27, M: 29, age: 75±7 y, weight: 70.4±17.5Kg, height: 1.63±0.12, BMI=26.2±4.5). Gait analysis was performed using a three-axis accelerometer (Locometrix®).

### Stride Regularity Index : a main gait variable

- Quantifies the similarity between successive gait cycles, which is also called gait variability
  - Correlated to the degree of underlying pathologies: ex knee and hip osteoarthritis, under single task gait analysis.
  - But also depends on cognitive functions such as attention working memory and executive function
  - Gait marker of great clinical values under dual task gait analysis
- <sup>1</sup> The male gait gait gait for the dementia (Ducruet O & al 2009),  
<sup>2</sup> Also correlated to MILD Cognitive Impairment (Montero-Odasso M & al 2009),  
<sup>3</sup> The male gait gait gait for future falls (Herman T & al 2010)

Patients performed initially a control reference single walking task and secondly an attention demanding task while walking. Dual Task consisted in walking whilst counting backward from fifty to one. We computed the evolution of walking speed (WS) and stride regularity index (SR), between the single and the dual walking tasks (Table 1)

## References

- 1 Segev-Jacobovski O et al. The interplay between gait falls and cognition: can cognitive therapy reduce fall risk? Expert Rev Neurother 2011; 11:1057-75,
- 2 Montero-Odasso M et al. Gait and cognition: a complementary approach to understanding brain function and the risk of falling. JAGS 2012; 60: 2127-36.

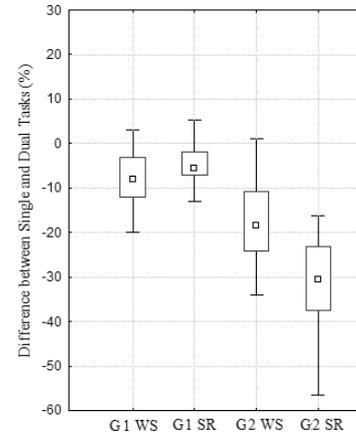
## Results:

**Table 1:** Mean values and SD of walking speed and stride regularity under single and dual task conditions.

	Single task	Dual task	Difference (%)
Walking Speed (m.s <sup>-1</sup> )	1.04 ± 0.26	0.9 ± 0.25	-12.9 ± 10.7
Stride Regularity	212 ± 63	171 ± 70	-21 ± 22

We identified two major groups by analysing WS and SR variables between single and dual tasks considering a 15% variation threshold (Figure 1). In the 1st group (21 patients, F=12, M=9) WS and SR remained constant. In the 2nd group (33 patients, F=15, M=18), 19 patients decreased both WS and SR and 14 patients decreased only SR without any change in WS. Two patients did not fit in either group: there was an increase of SR (magnet effect) but no change of WS.

**Figure 1:** Differences between single and dual tasks for Walking Speed (WS) and Stride Regularity (SR) for Group 1 (decrease between 0% and 15%) and Group 2 (decrease larger than 15%).



## Discussion:

Gait instability in the elderly has been reported as a predictive indication for falls and dementia. Motor disorders and cognitive resources are both implicated in gait instability. Gait analysis under single task provides important information about the involvement of underlying pathologies in gait. In addition, dual task for gait analysis provides important information about the role of cognitive function and dysfunction in gait instability.

**The DTGT, which is neither costly nor invasive, can be easily implemented and provides a valid and sensitive means of assessing motor-cognitive interaction in gait instability.**

## Implications/impact on rehabilitation:

Gait rehabilitation programs can be tailored according to the results of a DTGT thanks to information about changes in velocity and regularity. Groups, according to the involvement of motor disabilities and cognitive dysfunction can be identified in elderly people suffering from gait instability.

**Therefore specific gait rehabilitation programs according to the balance between motor and cognitive therapies can be adapted to each patient.**