

---

---

# QUANTIFICATION OF EFFECTS OF LEVODOPA TREATMENT IN PARKINSONIAN SYNDROMES

GALLI, M., CIMOLIN, V., VIMERCATI S., ALBERTINI, G., ONORATI, P. & DE PANDIS, MF.

**Abstract:** *The purpose of this chapter is to present the experience of the Posture and Motion Laboratory at the “San Raffaele Cassino” in the field of use of Gait Analysis (GA) in patients with Parkinson’s disease (PD) and with Progressive Supranuclear Palsy (PSP). In particular, the effects of levodopa medication on PD vs. PSP patients were quantified, comparing the OFF and ON state in the two different pathological conditions, using functional evaluation and GA. Data of the OFF and ON states in 10 PSP patients and 11 PD patients were compared. The results highlighted that the treatment based on Levodopa treatment had significant effects only on PD group (spatio-temporal parameters, kinematics and kinetics); PSP patients revealed no significant changes after the levodopa therapy.*

**Key words:** *Parkinson’s disease, PSP, Gait Analysis*



**Authors’ data:** Eng. **Galli M**[anuela]\*, \*\*; Eng. **Cimolin V**[eronica]\*, Eng. **Vimercati S**[ara]\*Prof. **Albertini G**[iorgio]\*\*, Dr. **Onorati P**[aolo]\*\*\*, Dr. **De Pandis M**[aria] F[rancesca]\*\*\*, \*Bioeng. Dept., Politecnico di Milano, Milano, Italy, \*\* IRCCS “San Raffaele Pisana” Tosinvest Sanità, Roma, Italy; \*\*\*“San Raffaele Cassino” Institute, Tosinvest Sanità, Cassino, Italy  
manuela.galli@polimi.it;veronica.cimolin@polimi.it;sara.vimercati@polimi.it;giorgio.albertini@sanraffaele.it; paolo.onorati@sanraffaele.it;  
maria.depandis@sanraffaele.it

**This Publication has to be referred as:** Galli M[anuela], Cimolin V[eronica], Albertini G[iorgio], Onorati P[aolo], De Pandis M[aria] F[rancesca] (2010). Quantification of effects of Levodopa treatment in Parkinsonian syndromes, Chapter xx in DAAAM International Scientific Book 2010, pp. xxx-xxx, B. Katalinic (Ed.), Published by DAAAM International, ISBN 978-3-901509-71-1, ISSN 1726-9687, Vienna, Austria DOI: 10.2507/daaam.scibook.2010.xx

---

---

### 3. Conclusions

The experience of the Posture and Motion Laboratory at the “San Raffaele Cassino” is described in the field of the use of GA in patients with PD and PSP. Our results demonstrated that quantitative GA may represent a precise, objective and reliable alternative to rating scales and commonly used tests in determining the dopaminergic response in patients with PD and PSP which provides a systematic evaluation to help in the early differentiation of PSP from other parkinsonian syndromes, like PD. Further studies should be conducted on this direction, with larger group of patients and considering sub-groups of patients, evaluating for example PD patients with walking problems or with freezing, in order to evaluate quantitatively if different responses to levodopa are found.

### 4. References

- Davis R B, Ounpuu S, Tyburski D J, Gage JR. A gait analysis data collection and reduction technique. *Human Movement Science* 1991; 10: 575-587
- Fahn S, Elton R, Members of the UPDRS Development Committee. In: Fahn S, Marsden CD, Calne DB, Goldstein M, eds. *Recent Developments in Parkinson's Disease*, Vol 2. Florham Park, NJ. Macmillan Health Care Information 1987, pp 153-163, 293-304
- Gage J.R. *The treatment of gait problems in cerebral palsy*. Gage JR editor. London: Cambridge University Press; 2004
- Golbe LI, Ohman-Strickland P. A clinical tapping scale for progressive supranuclear palsy. *Brain* 2007; 130: 1552-1565
- Holmberg B, Johnels B, Ingvarsson P, Eriksson B, Resengren L. CSF-neurofilament and levodopa tests combined with discriminant analysis may contribute to the differential diagnosis of Parkinsonian syndromes. *Parkinsonism and Related Disorders* 2001; 8: 23-31
- Keith RA, Granger CV, Hamilton BB, Sherwin FS. The Functional Independence Measure: a new tool for rehabilitation. In: *Advances in clinical rehabilitation*—Eisenberg MG, Grzesiak RC, eds. (1987) New York: Springer. 6–18
- Lubik S, Fogel W, Tronnier V, Krause M, König J, Jost WH. Gait analysis in patients with advanced Parkinson disease: different or additive effects on gait induced by levodopa and chronic STN stimulation. *Journal of Neural Transmission* 2006; 113: 163-173
- Moore ST, MacDougall HG, Gracies JM, Cohen HS, Ondo WG. Locomotor response to levodopa in fluctuating Parkinson's disease. *Exp Brain Res* 2008; 184: 469-478
- Morris ME, Huxham F, McGinley J, Dodd K, Iansek R. The biomechanics and motor control of gait in Parkinson disease. *Clinical Biomechanics* 2001; 16: 459-470
- Vokaer M, Abou Azar N, Zegers de Bayl D. Effects of levodopa on upper limb mobility and gait in Parkinson's disease. *Journal of Neurology, Neurosurgery and Psychiatry* 2003; 74: 1304-1307.