

# The diagnostic-therapeutic path in Parkinson disease

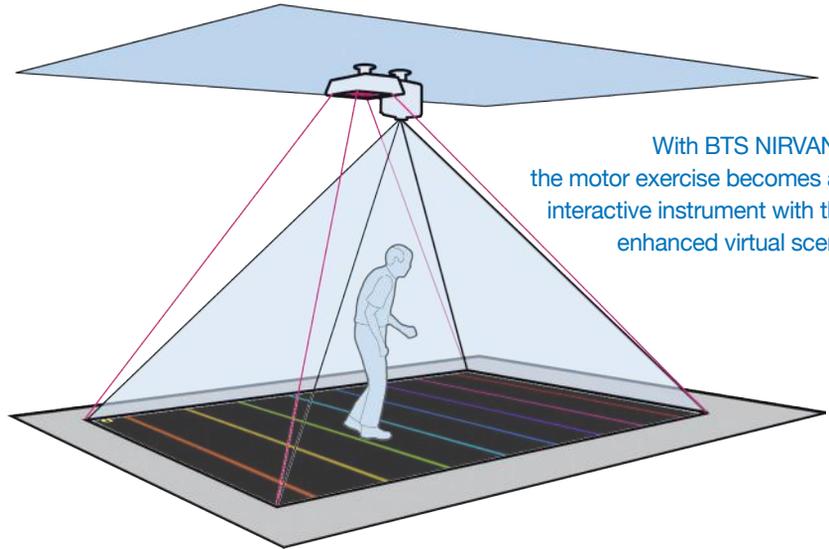
In subjects with Parkinson the physiotherapy rehabilitation is a very important instrument to fight and slow down the progression of the disease symptoms.

Even if it doesn't have a healing value, integrating it with pharmacologic therapy, it is possible to preserve a good patient physical tone and a significant recovery of motor capacities that are not already compromised.

Subjects affected by Parkinson are able to learn motor or procedure processes. For this reason, a good rehabilitation must include tools that can stimulate the preservation and the improvement of all motor functions, especially to support the everyday life (ADL).

Moreover, it is fundamental that the motor therapies are performed in high stimulating environments especially for a visual point of view, because during the disease progression, the subject loses the postural automatism depending more and more on external feedbacks.

**BTS NIRVANA is the first system that allows a complete immersion in a virtual environment**, without using any invasive tool (glasses, gloves, ...) that limits or alters the subject's freedom of interaction. BTS NIRVANA creates virtual environments that are projectable on horizontal or vertical areas, with whom the patient can interact through the simple movement.



With BTS NIRVANA the motor exercise becomes an interactive instrument with the enhanced virtual scene

The specific rehabilitative exercises have different levels of difficulty.

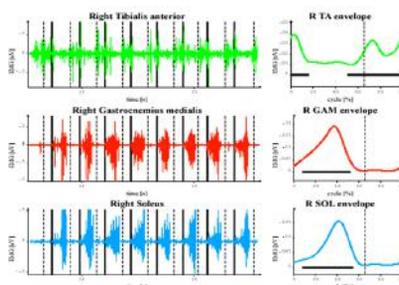
**Also the cognitive dimension can be influenced: to prevent the FREEZING disorder, that normally appears during the disease progression and that is very difficult to cure, BTS NIRVANA projects on the floor a series of parallel lines that play as a guitar at the foot passage.**

**In this way, the patient has the proper stimulus to overcome the motor block.**

To prevent the falling risk, the exercises of movement stimulation aim to strengthen the postural control. For example, the "follow-me" category includes exercises that consist in follow the elements that appear on the projected area. This type of exercise requires

the patient to execute a movement with on-line control.

BTS NIRVANA sensorial stimulation allows the intervention also on some problems that don't concern the motor field, as for example the depressive disorders.



Example of "follow-me" exercise and report of the EMG signals acquired during the trial

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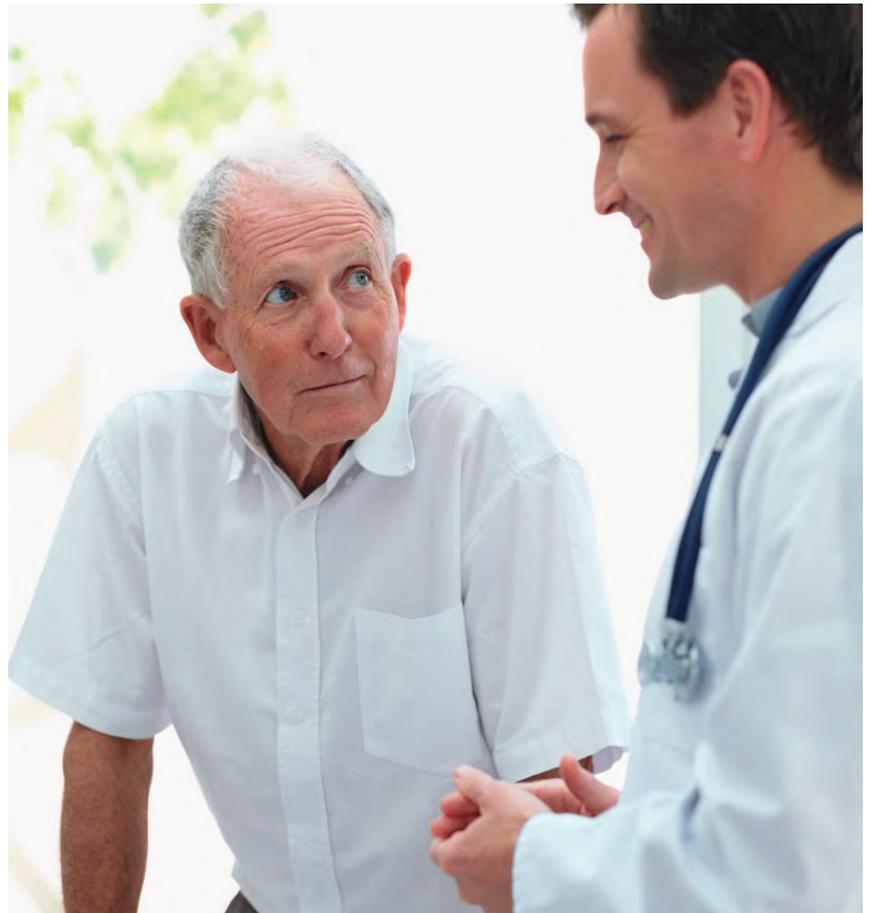
Parkinson disease strikes about 150-200 persons each 100.000 habitants and it is present in any population of the world. It is a complex pathological condition that involves different body systems and that alters in a significant way the patient mobility.

For these reasons it is necessary an objective and accurate evaluation, in order to face the disease at best.

Placing the instrumental evaluation beside the traditional approach guarantees a objectivity and especially the standardization of the Parkinson symptomatology' evaluation.

In fact, the clinical scales cannot necessary have the sensibility to find the small modifications of the motor performance, as example in case of slight disability or in relation with drugs action.

**The instrumental, not invasive and rapidly executed evaluation is necessary to accurately assess and evaluate the different phases of the Parkinson disease.**



The acquisition of segmental and joint kinematics is the starting point of analysis.

Thanks to the BTS FREEEMG system, it is possible to analyze the neuromuscular balance combining the inertial and electrogoniometric data with the non-invasive and dynamic electromyography. This information can be easily integrated in the rehabilitative project, transforming it in something very targeted for each patient.

*Analysis protocols: tremor analysis, analysis of reaching strategy, pointing and tapping, neuromuscular co-contraction.*

The correlation with the motor performance could be alternatively investigated with the dynamometric analysis (both static and dynamic), especially for those cases where the pathologic study is accompanied with a reduced kinematic alteration. The dynamometric platforms, the BTS SWAY software about stabilometric evaluation and the BTS DIGIVEC software for dynamic evaluation, analyze the postural condition and the motor control.

*Analysis protocols: altered stabilometry (sway is very significant in Parkinson).*

The kinematic analysis of deambulation and fine movements completes the evaluation executed by the optoelectronic system BTS SMART DX, which is composed by infrared cameras with high performances. The analysis and the report are obtained automatically thanks to BTS SMART-Clinic software.

*Analysis protocols: expressive movements, oscillation of upper limb during the walk, fine movements, writing, chewing, phonation, swallow, posture and standing analysis.*

The three systems can be integrated. Combining the modules it is possible to execute a multifactorial analysis.

