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MAGAZINE

Artificial Intelligence in the fight against Parkinson's: Potential and prospects

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Editorial by Giuseppe Jurman, published in the newspaper L'Adige on the occasion of International Parkinson's Disease Day, April 11, 2026.

Parkinson's disease today represents one of the most complex challenges in modern neurology, with a steadily increasing prevalence due to population aging and improvements in diagnosis. It is not a uniform condition, but a highly heterogeneous neurodegenerative disorder that progresses differently in each individual, presenting a wide range of motor and non-motor symptoms that affect both quality of life and clinical management. This variability, combined with global population aging, means that traditional diagnostic criteria—while still fundamental—can sometimes be too broad to capture the nuances needed for truly personalized care. In this context, the clinical priority is not only early diagnosis, but also the ability to predict disease progression with greater accuracy than standard observation allows.

The recent emergence of **Artificial Intelligence** (AI) in this field should not be seen as a technological revolution in itself, but as an expansion of physicians' analytical capabilities. By enabling machines to extract **predictive patterns** from large volumes of data (**machine learning**), complex clinical information can be transformed into models that support targeted therapeutic decisions. AI offers a powerful tool to address ongoing challenges in Parkinson's management, supporting **earlier and more accurate diagnosis**, informing personalized treatment choices, and enabling continuous, data-driven monitoring.

However, integrating these algorithms introduces a **new dynamic** into the traditional doctor–patient relationship. While AI promises to improve prognosis and the sustainability of care, it also raises ethical questions about responsibility in decision-making and the **risk of dehumanizing** the care pathway. There is therefore a clear need for a framework that ensures the robustness of AI models while fully integrating clinical expertise to optimize patient care.To prevent technology from becoming a barrier between clinician and patient, current research is increasingly focused on the "***clinician-in-the-loop" model***. In this approach, the **physician is not replaced** by the algorithm, but acts as its **critical supervisor and final interpreter**. This model expands the physician's role, ensuring that AI-driven insights are clinically meaningful, ethically grounded, and adapted to context. Recent studies show that this involvement can improve

the reliability of predictions, reduce algorithmic errors, and strengthen patient trust.

Fondazione Bruno Kessler is actively engaged in this area, in close collaboration with ASUIT (The Province of Trento's integrated university–healthcare system) and other leading healthcare and research institutions, both nationally and internationally. Its research, supported by provincial, national, and European projects, spans multiple areas of clinical interest, with the goal of developing increasingly effective and practical digital tools for neurologists working in this field.

Despite its enormous potential, the transition from research to everyday clinical practice still requires key steps. Many AI models, while highly effective in controlled settings, still lack robust external validation—that is, proof that they perform with the same accuracy in real-world conditions across diverse populations and clinical environments. The future of Parkinson's care will therefore depend on building a solid framework that integrates technological innovation with clinical judgment. Only through this **three-way relationship between physician, patient, and AI** will it be possible to transform the complexity of the disease into a more precise, safer, and above all more human approach to care.

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