Data Driven Paths to Advancing Precision Medicine Strategies for Parkinson's Disease: Critical Path for Parkinson's Consortium

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Objective

An update on the accomplishments of the Critical Path for Parkinson's (CPP) Consortium.

Background

The pharmaceutical pipeline for Parkinson's disease (PD) is rapidly expanding. Data sharing will facilitate decision-making during the development and review of medical products [1]. The CPP Consortium was launched in 2015 and is jointly funded by Parkinson's UK and pharmaceutical industry members under the auspices of Critical Path Institute [2]. The goals of CPP are 1) to advance drug development tools for PD trials by integrating worldwide data from observational cohorts and RCTs into a unified database, and 2) to provide a framework for advancing the regulatory maturity of digital health technologies [3]. The long-term goal is to enable precision medicine-based strategies for future PD clinical trials in a data-driven manner under the advisement of global regulatory agencies.

Methods

Members of the pharmaceutical industry, regulatory agencies (FDA & EMA), leading academic experts, professional societies, and international patient advocacy groups work together to accomplish the goals of CPP.

For more information about CPP please contact Executive Director Dr. Diane Stephenson (dstephenson@c-path.org)

Figure 1. Overview of Critical Path of Parkinson's (CPP)

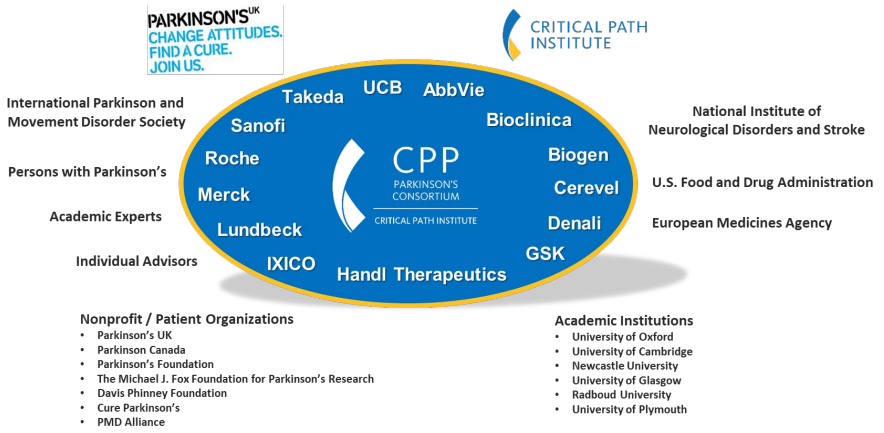
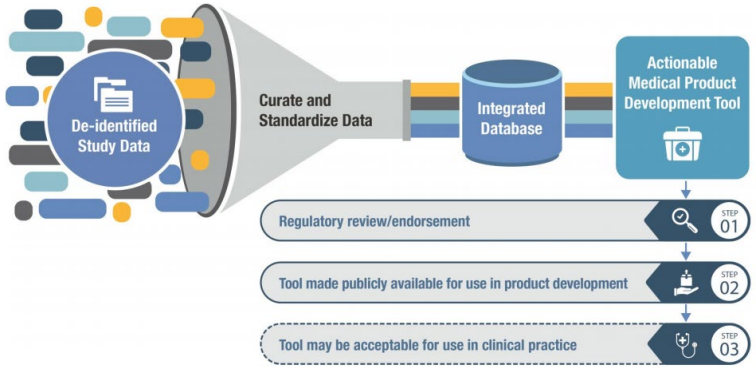


Figure 2. Overview of CPP's database and Drug Development Tools output.



Results

Progress to date includes the development of a PD patient-level database of >10,000 subjects (Figure 2), a model-based qualification opinion from the EMA for the use of Dopamine transporter (DAT) neuroimaging as an enrichment biomarker for early motor clinical trials [4], the release of a DAT-based trial simulator, submission to FDA and EMA for regulatory acceptance of a PD disease progression model, and creation of the Digital Drug Development Tools Initiative (3DT). 3DT leverages the WATCH-PD (Wearable Assessments in The Clinic and Home in PD) study, a multicenter, prospective, longitudinal study of PD progression in subjects with early, untreated PD to facilitate discussion and alignment with regulatory agencies on evidentiary considerations for digital assessments for drug development.

Conclusions

The precompetitive regulatory science focus of CPP promises to advance the regulatory maturity of key technologies that will measure signs and symptoms of PD of importance to patients and increase the probability of success in future PD therapeutic trials. Future strategies include expanding the CPP database with clinical, genetic, and neuroimaging and fluid biomarker data.

References

[1] Karpen et al., Ther Innov Regul Sci, 2021. [2] Stephenson et al., J Parkinsons Dis, 2015. 5(3): 581-94. [3] Stephenson et al., Digit Biomark, 2020. 4(S1): 28-49. [4] Stephenson et al., J Parkinsons Dis, 2019. 9(3): 553-563.

Acknowledgments: The Critical Path Institute's Critical Path for Parkinson's (CPP) Consortium is funded by Parkinson's UK and the following industry members: AbbVie, Bioclinica, Biogen, Cerevel, Denali, GSK, Handl Therapeutics, IXICO, Lundbeck, Merck Sharp and Dohme, Roche, Sanofi, Takeda, and UCB. We also acknowledge additional CPP member organizations, including Cure Parkinson's Trust, Davis Phinney Foundation, International Parkinson and Movement Disorder Society, Michael J. Fox Foundation, Newcastle University, Parkinson's Canada, Parkinson's Foundation, PMD Alliance, Radboud University, University of Cambridge, University of Glasgow, University of Oxford, University of Plymouth, NINDS, FDA, and EMA. We acknowledge all those who contributed data to the CPP integrated database including academic leaders, industry, NINDS and acknowledge the Michael J Fox foundation and industry partners for funding the PPMI study. Also, we like to acknowledge the support of our CPP Advisors.

Critical Path Institute is supported by the Food and Drug Administration (FDA) of the U.S. Department of Health and Human Services (HHS) and is 56.5% funded by FDA/HHS, totaling $16,749,891, and 43.5% funded by non-government source(s), totaling $12,895,366. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by, FDA/HHS or the U.S. Government. For more information, please visit FDA.gov.