Outpatient Supervised Periodic Energy Restriction in Post-Acute COVID-19 Syndrome: Psychometric Outcomes from the FASTCOV Pilot and Planned Molecular Analyses

Raquel Gómez Bravo

Raquel Gómez Bravo (1), Stephanie Menikou (2), Charlotte Léonie Gebhardt (1), Marta Sánchez-Castro (2), Claus Vögele (1), Jochen G. Schneider (2,3), Charles Benoy (1)
1) Rehaklinik, Centre Hospitalier Neuro-Psychiatrique (CHNP), Ettelbruck, Luxembourg
2) Department of Life Sciences and Medicine, University of Luxembourg, Belvaux, Luxembourg
3) Luxembourg Centre for Systems Biomedicine (LCSB), University of Luxembourg, Belvaux, Luxembourg

Background. Long COVID syndrome (LCS) lasts at least 12 weeks after SARS-CoV-2 infection and is characterised by fatigue, impaired cognition, affective symptoms and inflammatory features. No disease-modifying treatment is available, so care remains supportive. Suggested mechanisms include immune dysregulation, mitochondrial dysfunction and gut dysbiosis. Periodic energy restriction can lower inflammatory activity and engage autophagy and ketogenesis, but whether this approach is workable in an outpatient LCS setting had not been established.

Methods. FASTCOV (NCT06522750) was a single-arm prospective feasibility pilot. Twenty adults aged 32-62 years with medically confirmed LCS completed two days of preparation, seven days of supervised ambulatory Buchinger-Wilhelmi caloric restriction (350-500 kcal/day as vegetable broths and juices) with daily remote monitoring, refeeding, and three weeks of follow-up. Primary endpoints were adherence, feasibility of data collection, discontinuation and safety, each compared with pre-specified thresholds. Exploratory secondary measures (PHQ-9, GAD-7, FAS, WHODAS 2.0, WHOQOL-BREF, POMS, anthropometry) were gathered at four time points via REDCap and analysed with linear mixed models. Paired biospecimens included plasma for Simoa neuro-axonal markers (pTau217, A40/42, GFAP, NfL) and a 10-plex cytokine panel covering the IL-1/NLRP3 axis, PBMC DNA-methylation clocks, and stool shotgun metagenomics.

Results. Adherence to the caloric limit was 85% (17/20; threshold at least 75%); stricter adherence that also included the prescribed juices was 65%. Questionnaire completeness reached 88.75%, and daily self-reports during the fasting week were 95% complete. Discontinuation was 15% (threshold below 20%). No serious adverse events related to the intervention occurred. Exploratory analyses showed no psychological deterioration: anxiety and depression moved from moderate to mild severity, and quality of life improved in the short term, without statistical significance.

Conclusion. A seven-day outpatient, medically supervised Buchinger-Wilhelmi caloric restriction protocol is feasible, safe and psychologically well tolerated in LCS in an ambulatory setting when limited dietary flexibility is allowed. Psychometric trajectories will be linked to the molecular dataset analysis on progress to inform a planned randomised controlled trial.

Trial registration: NCT06522750.

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Biosketch – Jochen G. Schneider

Jochen G. SCHNEIDER, Prof, MD

ORCID ID: 0000-0003-2139-0602

CURRENT AND PAST POSITIONS

Principal Investigator / Head, Medical Translational Research group, Luxembourg Centre for Systems Biomedicine (LCSB), University of Luxembourg, Esch-sur-Alzette/Belvaux, Luxembourg (2011-present).

Department of Life Sciences and Medicine (DLSM), Faculty of Science, Technology and Medicine, University of Luxembourg.

Professor of Endocrinology, Department of Internal Medicine II - Gastroenterology, Hepatology, Endocrinology and Diabetology, Saarland University Medical Center, Homburg/Saar, Germany (2011-present).

Attending physician, Laboratory Medicine, Clinical Biochemistry / Pathobiochemistry and Internal Medicine, University of Würzburg, Germany (2009-2011).

EDUCATION

2015: Venia legendi in Internal Medicine, appointment as adjunct Professor of Medicine, Endocrinology, Saarland University.

2010: Habilitation and Venia legendi in Clinical Biochemistry, University of Würzburg, Germany. Board certification (CCT) in Internal Medicine, and subspecialty certifications in Endocrinology and Diabetology, Ärztekammer des Saarlandes (2014).

Postdoctoral research fellow, Division of Molecular Oncology and Division of Endocrinology, Metabolism & Lipid Research, Washington University in St. Louis, MO, USA (2002-2009).

2000: Dr. med. (doctorate in medicine), Saarland University.

AWARDS AND HONORS

Best teacher of the year, BMED UL, 2023.

Ruth L. Kirschstein Service Award Fellowship in Endocrinology, 2002.

British Heart Foundation Fellowship Award, 2011.

OTHER RELEVANT PROFESSIONAL ACTIVITIES AND ACCOMPLISHMENTS

Member, Comité National d'Éthique de Recherche (CNER), Luxembourg. Past member and Vice Chair of the Ethics Research Panel of UL (2011-2019). Founding member of the Animal Experimentation Ethics Panel at UL. Deputy Director, first year of the medical curriculum, University of Luxembourg; Course Director, Hormonology (BMED). Publication record: >100 peer-reviewed publications; ~7,270 citations (Google Scholar). Senior/corresponding author on work in Cell Metabolism, Nature Microbiology, and clinical journals.

Biosketch – Raquel Gómez Bravo

Raquel GÓMEZ BRAVO, MD, PhD

ORCID ID: 0000-0002-3786-8626

CURRENT AND PAST POSITIONS

General Practitioner, Centre Médical Steinsel, Luxembourg (2026-present).

General Practitioner and Clinical Researcher, Rehaklinik, Centre Hospitalier Neuro-Psychiatrique (CHNP), Ettelbruck, Luxembourg (2023-present).

WHO Technical Expert, Special Initiative on Violence Against Women and Girls (2025-present).

Postdoctoral Researcher, Rehaklinik, CHNP, Luxembourg (2022-2023).

Invited Lecturer, Amsterdam UMC (2020-2022).

Doctoral Researcher, Research Group on Self-Regulation and Health, Institute for Health and Behaviour, University of Luxembourg (2016-2022).

Team Member, WHO Collaborating Centre, Andalusian School of Public Health, Integrated Health Services based on Primary Health Care (2015-2016).

Emergency and Family Medicine physician in Spain, including Hospital Can Misses, Ibiza, and University Hospital La Paz, Madrid (2009-2014).

EDUCATION

2023: Postgraduate Certificate in Essentials of Medical Education, University of Warwick.

2022: PhD in Psychology, University of Luxembourg.

2021: Master in Urgencies and Emergencies, SEMES/University of Barcelona, Spain.

2011: European Expert in Quality Management in Health Care, AEC.

2009: Specialist in Family and Community Medicine, Spain.

2004: Medical Degree, University of Málaga, Spain.

AWARDS AND HONORS

Recipient of competitive research funding from the Luxembourg Ministry of Health (MISA) - FASTCOV Study (2023-2026), WONCA World, WONCA Europe, EGPRN, and EUROPREV.

BYSY Award, 2021. WONCA Europe Bursary, 2013.

OTHER RELEVANT PROFESSIONAL ACTIVITIES AND ACCOMPLISHMENTS

Chair, OECD PaRIS Primary Care Professional Network. Vice-President, WONCA Europe Working Party on Policy Advocacy. Vice-President, Association Luxembourgeoise pour la Formation Continue (ALFORMEC). Vice-President, Société Scientifique Luxembourgeoise de Médecine Générale (SSLMG). Development Officer, International Family Medicine Ultrasound Society (IFMUS). Co-Chair, WONCA Special Interest Group on Family Violence (2022-2025). Editorial Board Member, BJGP Open; Education for Primary Care; Portuguese Journal of General and Family Medicine; The Anatolian Journal of Family Medicine. Researcher in international projects addressing Long COVID, primary care, medical education, digital health, health policy, family violence/gender violence, obesity and delayed cancer diagnosis and survival, including PSY-LONG-COVID, PRICOV-19, PHC-Eurodata-Covid19, I-SHARE, inSIGHT, HEAL-Ex, and IMOCAFV. Publication record: >90 publications; first and senior author on work in primary care, Long COVID, digital health, health policy, and family violence, including publications in BMJ Open, BMC Public Health, and the European Journal of General Practice.