JOINT RESEARCH LAB

PROMISE@LAB

Protocols and Outcome Measures in Rehabilitation Medicine



Scientific Director Prof. Francesca Cecchi, AP, MD

UNIVERSITÀ DEGLI STUDI FIRENZE
Dipartimento di Medicina Sperimentale e Clinica

Fondazione Don Carlo Gnocchi

University of Florence - DMSC



Department of Experimental and Clinical Medicine

- Joint research environment across **multiple scientific disciplines**
- Focus on **high-quality clinical and experimental research**
- Strong commitment to **scientific and technological innovation**
- Advanced **academic and professional training** for students

UniFi departments affiliated to PROMISE@LAB

Industrial Engineering

Health Sciences

Neuroscience, Psychology, Drug Research and Child Health

IRCCS Fondazione Don Carlo Gnocchi, Florence



Complex Neuromotor Rehabilitation Unit

University-directed structure (UniFi - FDG)

~100 beds · >100 outpatients per day

A strong clinical environment supporting translational research

National excellence in rehabilitation

Third-sector, non-profit foundation for care, rehabilitation and research

23
centres + 28 outpatient clinics

9
Italian regions

2
IRCCS: Milan and Florence

356,961
patients assisted

211
researchers

302
scientific publications

FDG figures: Bilancio di Missione 2025 (2025 data)

Mission and expertise

We develop and validate **outcome measures** and **innovative treatment protocols** in rehabilitation medicine, and identify **predictors and biomarkers** of response to treatment.

Interdisciplinary research group

- Physiatrists, geriatricians, neurologists
- Physiotherapists, speech and occupational therapists
- Psychologists

Development and validation

- Outcome measures
- Rehabilitation interventions
- Rehabilitation technologies

Focus

- Rehabilitation of neurological conditions
- Musculoskeletal conditions
- Active and healthy ageing
- Digital health

Innovation

- Co-creation with stakeholders
- Patient and public involvement
- Use of AI tools

WHAT WE STUDY

Research focus



01

Innovating and improving rehabilitation **assessment and treatment protocols**

02

Comparing **treatment effectiveness**

03

Supporting technological development through **co-creation with stakeholders**

04

Medical device testing

05

Exposures affecting patients' outcomes

06

Co-developing outcome **prediction models**

CLINICAL AREAS

Stroke | **Parkinson's disease** | **Musculoskeletal conditions** | **Healthy ageing** | **Digital health**

HOW WE WORK

Main activities

Clinical studies

- Multicentric observational studies
- Randomized controlled trials
- Implementation studies

Measurement and validation

- Clinical measures validation
- Robot- and sensor-derived measures validation
- Cross-cultural adaptation

Technology and co-design

- Co-creation
- Medical devices testing
- Usability and feasibility

SCIENTIFIC OUTPUT

A growing scientific impact

134

publications, 2020 - Sep 2026

2,041

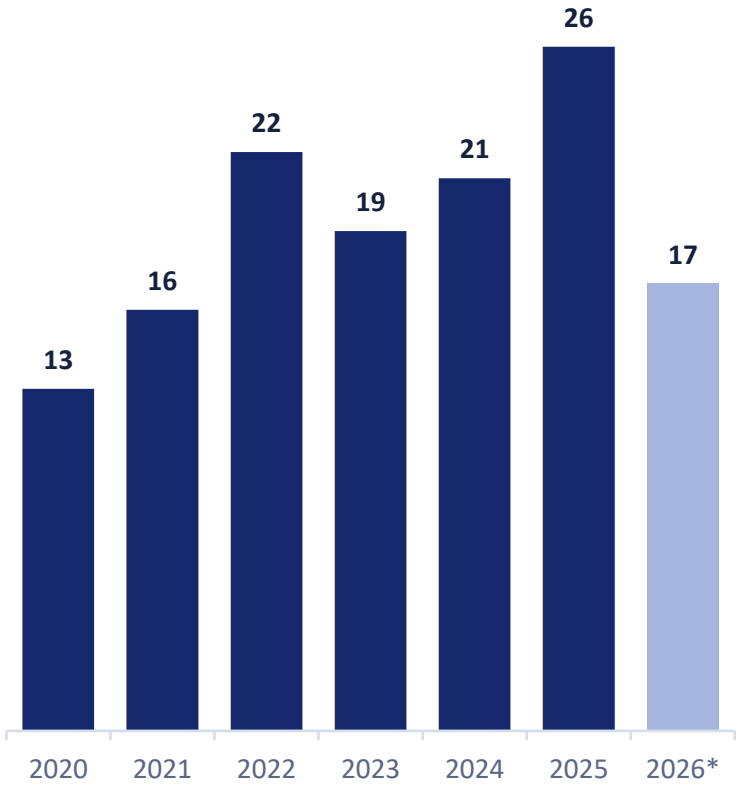
citations, 2020 - Sep 2026

2020 → 2025

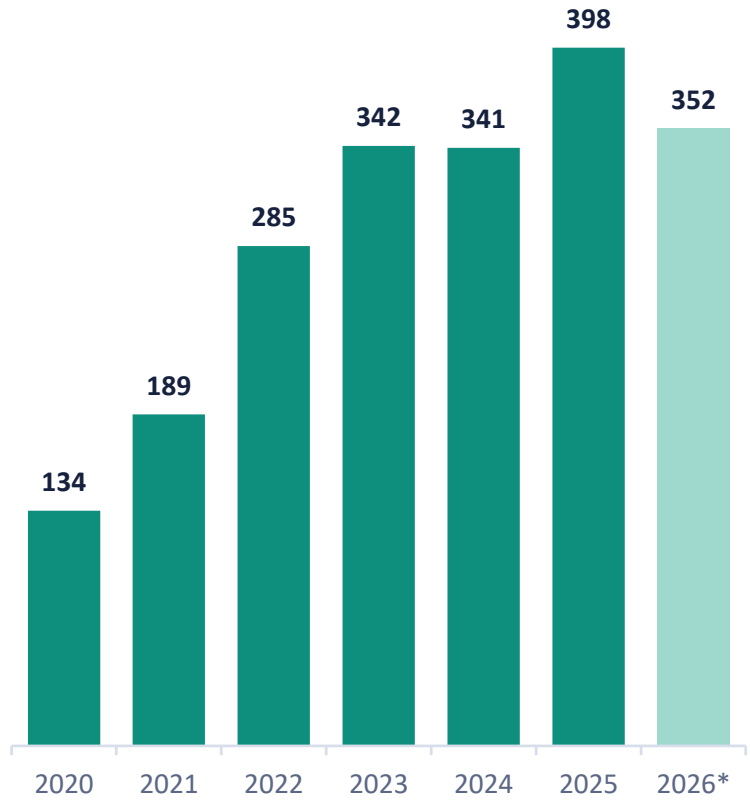
×2 publications per year

×3 citations per year

Publications per year



Citations per year



** 2026: data up to September*

TECHNOLOGIES

End-to-end technologies for rehabilitation



Gloreha

IDROGENET · Upper-limb robotics



MOTORE

Humanware · Upper-limb robotics



Tyrosolution

Tyromotion · Robotic & sensor-based



C-Mill

Motek · Gait and balance



Walker View

TecnoBody · Gait and posture



D-Wall

TecnoBody · Posture and balance



OptoGait

Microgate · Gait analysis

From upper-limb robotics to gait, balance and motion analysis: technology for both assessment and treatment

Virtual reality, neurophysiology and neuromodulation

Neurophysiology



64-channel EEG

Be-Plus electroencephalograph



EMG and evoked potentials

2 × 5-channel systems

Neuromodulation



rTMS

Repetitive magnetic stimulator, MagVenture R-100



tDCS

2 Starstim systems + 1 EMS system

VR and telerehabilitation



VRRS

Virtual Reality Rehabilitation System, Khymeia



VRRS Home Kit

Telerehabilitation at home, Khymeia

Also available: 40-channel EEG (Mizar), TMS neuronavigation (Localite), polysomnography (Blu-net), E-Prime

ONGOING RESEARCH

What we are working on

01 Stroke

02 Neurodegenerative diseases

03 Healthy ageing and digital health

04 Musculoskeletal conditions

Stroke: registries, cohorts and trials

STRATEGY
Registry

Design and national implementation of a registry of post-stroke rehabilitation patients, to evaluate processes and outcomes

Data-driven prediction models · PI F. Cecchi

BIG-MENTI
Multicentric observational

National Database of the Virtual Institute of Cerebrovascular Diseases

PI P. Calabresi, IRCCS Gemelli, Rome

PESO
Prospective longitudinal

Parametrare Esiti Stroke Ospedalieri: outcomes of patients with an acute cerebrovascular event

PI P. Palumbo, USL Toscana Centro

REDIRECT
RCT

Robot-assisted rehabilitation vs occupational therapy for upper-limb functional recovery in chronic stroke

PI F. Cecchi · Fondazione Intesa Sanpaolo

SCORES
Multicentric RCT

Sensory and Cognitive Outcomes of Robotic Exercises in Stroke

PI M. Germanotta, FDG Rome

CO-AIDER
Clinical validation

AI-based decision support system for robotic upper-limb rehabilitation in patients with stroke

PI I. G. Aprile, FDG Rome

BE-TOP
Multicentric trial

EEG biomarkers to optimise and personalise action observation therapy for the upper limb in chronic stroke

PI F. Infarinato, IRCCS San Raffaele, Rome

7 **ongoing stroke studies**
robotic, AI-supported and EEG-guided rehabilitation

Neurodegenerative diseases

Early differential diagnosis from saliva

Raman spectroscopy

SANDY-POC

An innovative method in SAliva samples for the early differential diagnosis of high-impact NeuroDegenerative diseases through Raman spectroscopY

Multicentric prospective observational study
PI B. Nacmias, FDG

Saliva biomarkers

MINERVA

A new method for the diagnosis of neurodegenerative diseases based on the biochemical profiling of saliva

Multicentric prospective observational study
PI P. Arcuri, FDG Milan

ROOMMATE

A cohort multiple Randomized Clinical Trial - AggRegated system Of sensOrs and Multimedia Monitors: technology for innovAtion and personalizaTion of rEhabilitation care

PROGRAMME
THCS JTC 2023 "Healthcare of the future"

ROLE
Coordinator - IRCCS FDG (PI F. Cecchi)

DURATION
June 2024 - May 2027

The ROOMMATE consortium aims to:

1. **Identify and develop innovative technological solutions** aimed at relieving the pressure on health and care facilities
2. **Overcome current barriers** to implementing technological solutions in the continuum of rehabilitation, addressing accessibility, sustainability and equity of care for all
3. **Foster a shift toward digitisation** of evaluation, treatment, monitoring and rehabilitation, adopting sustainable and user-friendly technologies that promote equity and accessibility
4. **Support patients, researchers and healthcare providers** to improve quality of care, and support caregivers in caring for their close ones

CONSORTIUM AND FUNDING

Funded by the European Union

INTEGRA

Co-creation of an INnovative TR Ecosystem accessible on a GRAnd scale to persons with disabilities living in the community

PROGRAMME
THCS JTC 2025 (Horizon Europe co-funded)

ROLE
Coordinator - IRCCS FDG (PI F. Cecchi)

DURATION
36 months, from March 2026

The INTEGRA consortium aims to:

1. **Co-create a scalable, adaptable telerehabilitation (TR) ecosystem** integrated into primary and community care, tailored to different European healthcare contexts
2. **Improve functioning, participation and quality of life** of persons with disabilities living in the community through personalised, home-based TR services
3. **Overcome barriers to TR adoption** (regulatory, technological, organisational, socio-cultural), promoting equity, accessibility and digital inclusion
4. **Develop a multidimensional EU knowledge base** to benchmark best practices and support evidence-based redesign of TR services across Europe
5. **Support patients, caregivers and healthcare professionals** through co-creation, e-health coaching and sustainable service models, strengthening continuity of care

CONSORTIUM AND FUNDING

Funded by the European Union

PRISM

PRISM

Personalised Rehabilitation: the InterdiSciplinary Management of non-specific Low Back Pain

PROGRAMME
EP PerMed - Education Call 2025

ROLE
Leading partner - IRCCS FDG

FOCUS
Non-specific low back pain

The PRISM project aims to:

1. **Develop a scalable, reusable asynchronous training programme** for Personalised Interdisciplinary Rehabilitation (PIR) of non-specific low back pain
2. **Enhance professionals' competences** in multidimensional assessment, clinical reasoning and personalised interventions, based on best evidence and real clinical cases
3. **Promote interdisciplinary collaboration,** shared decision-making and patient engagement as core components of personalised rehabilitation pathways
4. **Address cultural, educational and organisational barriers** that limit the adoption of biopsychosocial, personalised approaches to low back pain
5. **Improve Personalised Medicine literacy,** enable knowledge translation into practice and support long-term reuse of training content in education

CONSORTIUM AND FUNDING

Funded by the European Union

EP PerMed European Partnership for Personalised Medicine

Fondazione Don Carlo Gnocchi

Université Lumière Lyon 2

Completed projects

AGAPE

Active aGeing And Personalised service's Ecosystem

AAL Programme, Call 2021
Lead: Medea srl · FDG PI: F. Cecchi

Age-It

Ageing well in an ageing society

PNRR - Extended Partnership PE8 (PE0000015)
WP6 · PI F. Cecchi

THE

Tuscany Health Ecosystem - Spoke 3

PNRR - MUR, Mission 4
PI F. Cecchi

VIRTREAD-PD

Virtual reality combined with treadmill training in Parkinson's disease

Randomised controlled trial
PI F. Cecchi

INERTIAL

Reliability and validity of sensor-derived measures in Parkinson's disease

Pre-market clinical investigation
PI F. Cecchi

IN-FORMA

Innovative, adaptive platform to promote healthy and active ageing

PR FESR Toscana 2021-2027
Lead: Medea srl
UniFi PI: F. Cecchi · FDG PI: C. Castagnoli

COLLABORATIONS

Our network

Universities, research institutes, hospitals and companies we work with in Italy and abroad

ITALY

Age.Florence Florence Ageing Research Center

rin rete IRCCS delle neuroscienze e della neuroriabilitazione

AIR LAB AI FOR REHAB

LABION LABORATORY OF NANOMEDICINE AND CLINICAL BIOPHOTONICS

aouc Azienda Ospedaliero Universitaria Careggi

SST Servizio Sanitario della Toscana

SST Servizio Sanitario della Toscana · AZIENDA OSPEDALIERO UNIVERSITARIA PISANA

Università di Genova Dibris

Sant'Anna Scuola Universitaria Superiore Pisa

SCUOLA NORMALE SUPERIORE

Consiglio Nazionale delle Ricerche

MEDEA

INAIL CENTRO PROTESI

Università Stranieri Siena

HUMANITAS RESEARCH HOSPITAL

IRCCS San Raffaele

INTERNATIONAL

Cochrane Rehabilitation

Universitatea de Medicină și Farmacie Carol Davila

Roessingh Centrum voor Revalidatie

TU Delft

emovo

Sacyl

Université Lumière Lyon 2 · disp

NTNU Norwegian University of Science and Technology

PEOPLE

Scientific board and coordinators

SCIENTIFIC BOARD



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Scopus profile



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COORDINATORS



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Parkinson's disease
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Michele Piazzini
Digital health
PT, MSc, PhD · FDG-DMSC
Scopus profile

PEOPLE

The team



PT physiotherapist · OT occupational therapist · ST speech therapist · PSY psychologist · MD medical doctor · RN registered nurse

VA **Virginia Ambrogi**
PSY, MSc

TC **Tommaso Ciapetti**
PT, MScs · Scopus

MV **Maria Luigia del Vicario**
PT, MScs · Scopus

MM **Mario De Marco**
PT, MSc, PhDs · Scopus

AN **Agnese De Nisco**
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Cardiorespiratory Research Unit

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PT

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OS **Olimpia Salvini**
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MD, Neurologist, PhD · Scopus

Thank you!

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