Professor Rémy Burcelin, PhD, HDR

INSERM Research Director (DR1) – Metabolism, Microbiota & Cardiometabolic Diseases

Toulouse, France
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Nationality: French
Date of birth: August 26, 1965

Executive Profile

Internationally recognized scientist in metabolism, diabetes, microbiota research, and cardiometabolic diseases. Professor Rémy Burcelin is a pioneer in the study of the gut–brain axis and the role of intestinal microbiota in metabolic disorders, obesity, diabetes, dyslipidemia, and cardiovascular diseases. His work has significantly contributed to establishing the microbiota as a central regulator of metabolic homeostasis and therapeutic innovation.

He has coordinated numerous national and European research programs, founded biotechnology companies, developed patented technologies, and published more than 230 peer-reviewed scientific articles with a high international impact.

Education & Academic Qualifications

Year	Degree / Qualification	Institution
2000	Habilitation à Diriger des Recherches (HDR), Cellular Biology	University of Nice – Supervisor: Prof. Y. Lemarchand
1992	PhD in Molecular Endocrinology	Paris – Supervisor: Prof. J. Girard
1989	Master's Degree (MSc), Molecular Endocrinology	Université Pierre et Marie Curie (Paris VI) – Supervisor: Prof. R. Assan
1986	BTS in Biological Analyses	Marseille

Year	Degree / Qualification	Institution
1984	Technical Baccalaureate F7bis – Biological Analyses	Marseille

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Postdoctoral Training

Years	Institution	Mentor
1992–1993	Institut Jacques Monod, Paris VII	Dr. Thierry Grange
1994–1996	Albert Einstein College of Medicine, New York, USA	Prof. Maureen Charron
1997–1999	University of Lausanne, Switzerland	Prof. Bernard Thorens

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Academic & Research Positions

INSERM & University Appointments

- **2011–Present** – INSERM Research Director DR1, Toulouse
  Head of Research Team: *Intestinal Risk Factors in Cardiometabolic Diseases*
- **2008–2011** – INSERM Research Director DR2, Toulouse
  Head of INSERM Team: *Functional Genomics of Diabetes*
- **2001–2008** – Full Professor, Université Paul Sabatier, Toulouse
  Director of CNRS Research Team: *Metabolic Functional Genomics*
- **1999–2001** – Assistant Professor and Research Associate, University of Lausanne, Switzerland

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Scientific Expertise

Main Research Areas

- Gut microbiota and metabolic diseases
- Gut–brain axis
- Diabetes and obesity
- Cardiometabolic risk factors

- Dyslipidemia and cardiovascular diseases
- Neuroendocrine regulation of metabolism
- Translational metabolic medicine
- Metagenomics and tissue microbiota
- Microbiota-based therapeutic strategies

Leadership, Scientific Organization & International Activities

Scientific Boards & Committees

- Scientific Council Member, French Diabetes Society (SFD) (2004–2006)
- Scientific Council Member, European Association for the Study of Diabetes (EASD) (2005–2008)
- Member of French National Research Agency (ANR) Committees:
    - Metabolic Pathophysiology
    - Inflammation
    - Sectorial ANR Committee (2009–2012)
- Scientific Council Member, Francophone Foundation for Diabetes Research (2014–2016)
- Editorial and Review Boards:
    - *Endocrinology*
    - *Frontiers in Neuroendocrinology*
    - Reviewer for leading journals including *Nature*, *Science*, *JCI*, *Diabetes*, *Diabetologia*, and *Molecular Metabolism*

Strategic & Industrial Advisory Roles

Scientific advisor and strategy consultant for pharmaceutical and biotechnology companies including:

- Novartis
- MSD
- Sanofi
- Vaiomer
- Lallemand

Founder & Scientific Networks

- Founder, *Autonomic Nervous System Study Club* (2002–Present)

- Founder, *EASD Incretin Study Group* (2008–Present)
- Founder, *MétaboToul* – Metabolism Research & Education Network in Toulouse (2009–Present)

Research Program Coordination

Principal Investigator and Coordinator of numerous national and international projects including:

- Swiss FNRS
- JDRF (Juvenile Diabetes Research Foundation)
- Max Cloetta Foundation
- EASD Research Programs
- 8 French ANR grants
- European FP7 Program – FLORINASH
- Joint Programming Initiative (H2020)
- FRM Team Grants
- SFD Research Programs
- FFRD Research Programs
- Regional Research Programs
- Industrial partnerships with MSD, Lilly, and Sanofi

International Conferences & Scientific Visibility

- 30–50 invited lectures per year worldwide
- Speaker at major international congresses in diabetes, metabolism, microbiology, and cardiometabolic diseases
- Organizer of major international conferences:
    - FLORINASH (2007–2011)
    - Keystone Symposia on Microbiota, Newport, USA (2016)
    - EASD Incretin Study Group Meetings (2008, 2010, 2012)
    - Joint Programming Initiative Conferences (2018–2020)

Teaching & Mentoring

University Teaching

- Undergraduate teaching in Physiology – University of Lausanne

- Master's teaching in:
  - Animal Physiology
  - Digestive Physiology
  - Nutrition & Metabolism
- Graduate and doctoral education in Toulouse and Montpellier

Mentorship

- Supervision of PhD and postdoctoral researchers
- Participation in recruitment committees for:
  - INSERM Researchers
  - Associate Professors
  - Professors
- Approximately 25 doctoral and postdoctoral trainees supervised

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Scientific Awards & Distinctions

Year	Award	Topic
1994	JDRF Award (USA)	Glucagon & Type 1 Diabetes
2001	Dr. Max Cloetta Award (Switzerland)	Gut–Brain Axis
2005	Georges Pompidou Foundation Award	Gut–Brain Axis
2005	Apollinaire Bouchardat Award (SFD)	Diabetes Research
2008	Jean Valade Award – Fondation de France	Microbiota Research
2015	FRM Award	Biostatistics in Microbiology
2023	Candidate for the Professor Roger Assan Prize	

Innovation, Patents & Entrepreneurship

Patents

- Holder or co-holder of 17 patents related to metabolism, microbiota, and therapeutic innovation

Biotechnology Entrepreneurship

Companies Founded

- **Vaiomer** (2011) Biotechnology company based on intellectual property transfer related to microbiota analysis and diagnostics
- **Physiogenex** (2003) Preclinical CRO specialized in metabolic diseases and diabetes research
- **Aviwell** (2016) Biotechnology company focused on microbiota-based health solutions

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Scientific Contributions & Impact

Professor Burcelin's scientific career spans more than three decades of pioneering contributions in metabolism, diabetes, gut–brain physiology, and microbiota research.

Major Scientific Contributions

1. Insulin Sensitivity & Glucose Metabolism (1989–1995)

During his doctoral work at Hôpital Bichat under the supervision of Professor Roger Assan, Professor Burcelin demonstrated that insulin sensitivity in newly diagnosed type 1 diabetic patients is a major determinant of glycemic imbalance. His work showed that intensive insulin therapy and immunotherapy could transiently restore insulin hypersensitivity beyond levels observed in healthy individuals.

He subsequently investigated the molecular regulation of glucose transporters (GLUT2, GLUT4) and hexokinases in muscle, adipose tissue, and liver using diabetic rodent models and transgenic mice. His work contributed substantially to understanding insulin resistance mechanisms and glucagon receptor biology.

Among his major methodological achievements was the implementation and development of hyperinsulinemic-euglycemic clamp techniques in mice, which became instrumental for studying insulin action, leptin signaling, and metabolic physiology.

This translational expertise contributed to the creation of several biotechnology companies including Physiogenex, Betagenex, and Cardiomedex.

2. Discovery of the Gut–Brain–Peripheral Axis (1995–2005)

Working with Professor Bernard Thorens in Lausanne, Professor Burcelin became one of the pioneers of physiological glucose sensing by the hepatoportal system.

His work demonstrated that:

- The GLP-1 receptor is essential for hepatoportal glucose sensing
- GLUT2-dependent glucose detection controls systemic glucose utilization
- The gut–brain axis regulates liver glycogen storage, insulin secretion, vascular function, and muscle metabolism
- Enteric and central GLP-1 signaling are integrated regulators of whole-body glucose homeostasis

These discoveries contributed to the conceptual framework supporting incretin-based therapies and GLP-1 biology.

This work also led to the creation of the biotechnology company Enterosys.

3. Pioneer of Metabolic Endotoxemia & Tissue Microbiota (2005–Present)

Professor Burcelin's laboratory played a foundational role in establishing the gut microbiota as a central regulator of cardiometabolic diseases.

His group identified:

- The role of bacterial lipopolysaccharides (LPS) in metabolic inflammation
- The concept of "metabolic endotoxemia" as a trigger of obesity and insulin resistance
- The presence of circulating bacterial DNA in metabolic diseases
- The existence of tissue microbiota associated with diabetes, cardiovascular disease, and liver disease
- Mechanisms linking dysbiosis, immunity, GLP-1 resistance, and cardiometabolic dysfunction

He coordinated the major European FP7 program FLORINASH, demonstrating links between microbial ecology and hepatic steatosis.

His teams also developed innovative bioinformatic and biostatistical tools for microbiome analysis and translational medicine.

These discoveries supported the development of microbiota-oriented biotechnology companies including Vaiomer and Aviwell.

Translational & Industrial Impact

Professor Burcelin's work contributed to:

- The emergence of microbiota-based metabolic medicine
- New therapeutic approaches targeting gut–brain communication
- Development of biomarkers for cardiometabolic diseases
- Advances in GLP-1 biology and incretin physiology
- Translational applications in obesity, diabetes, NAFLD/NASH, and cardiovascular diseases

- Development of industrial platforms in metabolic phenotyping and microbiome-based diagnostics

Representative High-Impact Publications

Insulin Resistance & Metabolic Regulation

- Viollet B., Andreelli F., Jorgensen S.B., et al., and Burcelin R. *J Clin Invest* (2003) – AMPK alpha2 catalytic subunit controls whole-body insulin sensitivity.
- Pospisilik J.A., Knauf C., Joza N., et al., and Burcelin R. *Cell* (2007) – Mitochondrial oxidative phosphorylation and protection from obesity and diabetes.
- Cook S., Hugli O., Egli M., et al., and Burcelin R. *Diabetes* (2004) – Endothelial nitric oxide synthase deficiency and insulin resistance.

Gut–Brain Axis & GLP-1 Physiology

- Burcelin R., Da Costa A., Drucker D., Thorens B. *Diabetes* (2001) – GLP-1 receptor-dependent hepatoportal glucose sensing.
- Knauf C., Cani P.D., Perrin C., et al., and Burcelin R. *J Clin Invest* (2005) – Brain GLP-1 regulates glycogen storage and insulin secretion.
- Charpentier J., Waget A., Klopp P., et al., and Burcelin R. *AJP Gastrointestinal and Liver Physiology* (2018) – Gut-vagus-brain axis and lixisenatide action.

Microbiota & Metabolic Diseases

- Cani P.D., Amar J., Iglesias M.A., et al., and Burcelin R. *Diabetes* (2007) – Metabolic endotoxemia initiates obesity and insulin resistance.
- Amar J., Serino M., Lange C., et al., and Burcelin R. *Diabetologia* (2011) – Tissue bacteria and diabetes onset in humans.
- Hoyles L., Fernandez-Real J.M., Federici M., et al., and Burcelin R. *Nature Medicine* (2018) – Molecular phenomics and metagenomics of hepatic steatosis.
- Garidou L., Pomie C., Klopp P., et al., and Burcelin R. *Cell Metabolism* (2015) – Gut microbiota regulation of intestinal immune responses and metabolic disease.

Selected Scientific Topics

- Gut microbiota and insulin resistance
- Microbiota–brain communication pathways
- Intestinal endocrine regulation
- Inflammation and metabolic disease
- Cardiometabolic consequences of dysbiosis
- Nutritional modulation of microbiota
- Personalized metagenomic medicine

Publications & Bibliometric Indicators

- More than 230 peer-reviewed scientific publications
- H-index: approximately >100 (Scopus)
- Publications in leading international journals in metabolism, endocrinology, microbiology, and translational medicine

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Professional Affiliations

- INSERM
- European Association for the Study of Diabetes (EASD)
- French Diabetes Society (SFD)
- International microbiota and metabolism research networks

References

Available upon request.