



Healthy and Well-being Chronic diseases

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First **InPrInt** Seminar

Partnership Building towards
Stronger Engagement in International Collaboration

UFMG, Belo Horizonte

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Chronic Disease Section

- Overview on how Chronic Disease research is carried out at UFMG



Partner institutions willing to collaborate with UFMG in this project (so far)

- **University of Queen Mary University of London**
- **INRA: Institut national de la recherche agronomique**
- **University of Warwick**
- **University of Sheffield**
- **KU Leuven-Rega Institute**
- **Universidade de Lille**
- **University of Southampton**
- **University of Georgia**
- **McLennan Massey University**

DisCUssion Time!

UFMG Graduate programs taking part in the project **CHRONIC DISEASES -**



**22 Graduate Programs take part in the
Chronic diseases project**

22 Graduate programs taking part in the project **CHRONIC DISEASES** are distributed in academic units



Institute of Biological Sciences

- 6 Graduate programs: Cell Biology, Biochemistry and Immunology, Genetics, Physiology and Pharmacology, Technological and Biopharmaceutical Innovation and Bioinformatics
- 580 graduate students and 145 advisors.



School of Medicine

- 6 Graduate programs: Sciences applied to Surgery and Ophthalmology, Sciences applied to Adult Healthy, Sciences of Healthy –Infectology and Tropical Medicine, Sciences of Healthy – Child and Adolescent Healthy, Pathology, and Public Healthy
- 521 graduate students 129 advisors.



School of Physical Education, Physiotherapy and Occupational Therapy

- 2 graduate programs: Sports Science – PPGCE and Rehabilitation Science
- 30 graduate students, 5 advisors.

22 Graduate programs taking part in the project **CHRONIC DISEASES** are distributed in academic units-



School of Dentistry

- 1 Graduate program: Dentistry.
- 159 graduate students, and 36 advisors.



School of Music

- 1 Graduate Program: Music.
- 10 graduate students and 2 advisors.



Department of Psychology

- 1 Graduate program: Cognition and Behavior
- 32 graduate students
5 advisors.



School of Pharmacy

- 4 graduate programs: Clinical and Toxicological Analyzes, Medicines and Pharmaceutical Assistance, Pharmaceutical Sciences, and Food Science
- 19 graduate students and 5 advisors.

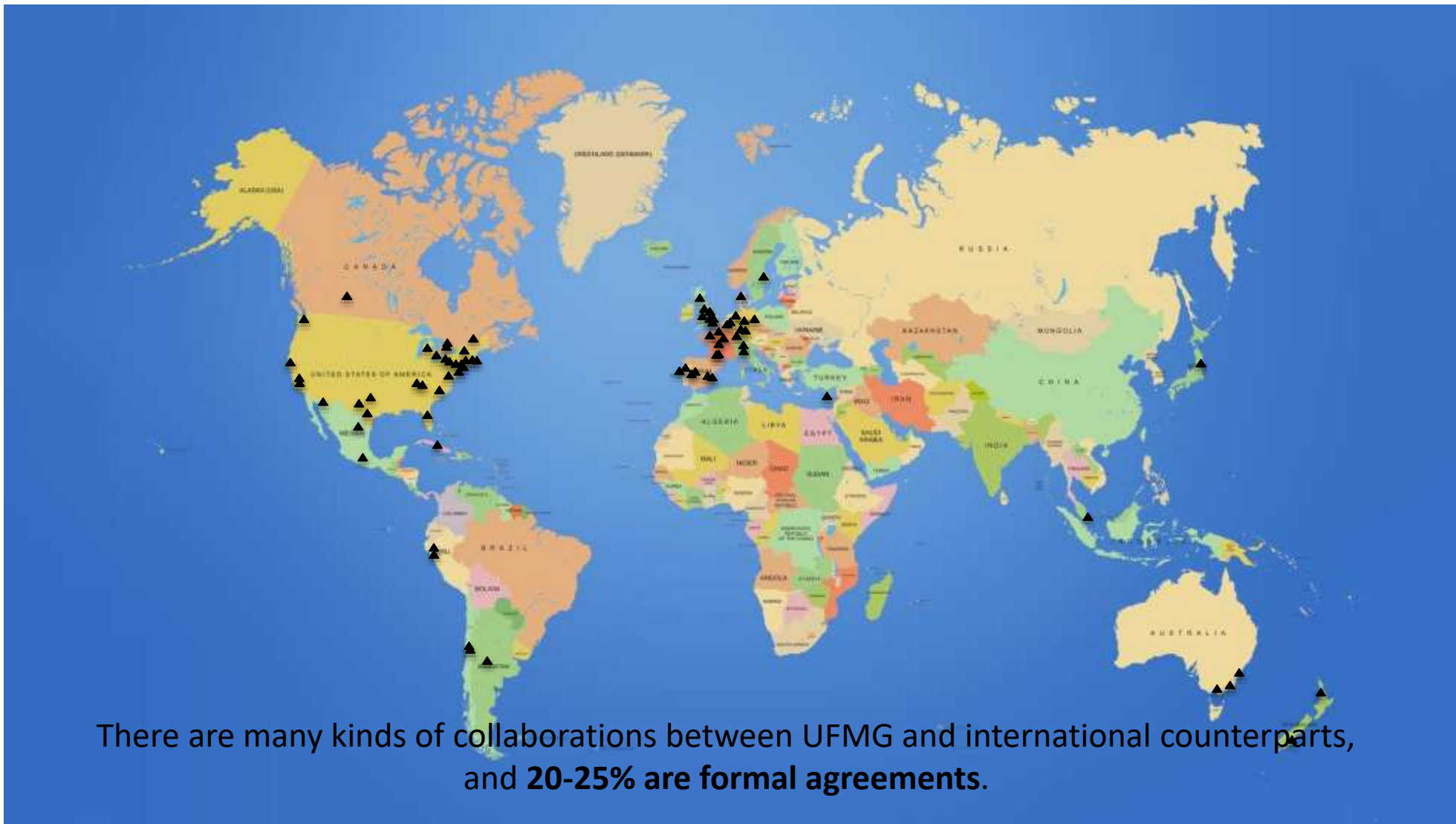
Research issues – Chronic diseases

	MEDICINE	ICB	PHARMACY	DENTISTRY	EEFFTO	PSYCHOLOGY	MUSICIAN
Cancer	*	*	*	*			
Infectious diseases	*	*	*	*			
Neuronal-related diseases	*	*			*		*
Biomarkers/Diagnosis	*	*	*				
Cardiovascular diseases	*	*			*		
Neuronal disorders/Psychology		*				*	*
Nutrition/Obesity/Diabetes		*	*		*		
Epidemiology	*		*				
Healthy assistance	*			*			
Inflammatory bowel diseases	*	*					
Musculoskeletal diseases		*			*		
Endocrinology	*						
Alcoholism		*					
Chronic pain		*					
Kidney diseases	*						
Liver diseases	*						
Non-transmissible chronic and occupational diseases	*						
Pediatrics: coordination disorders in preterm infants					*		
Pulmonary diseases		*					
Transplantation	*						

Existing competencies and expertise: What we have to offer!

- Diverse group of supervisors with great expertise and relevant scientific production in several areas of chronic diseases research;
- Amount and quality of the graduate students, especially PhD students. Highly trained students.
- Most of our Faculty have experience as international Visiting Scholars.

PhD programs engaged on Chronic Disease research have great experience in collaborating with foreign institutions



Existing competencies and expertise are divided into 3 groups



Clinical

- Access to patients that are treated in our clinics and laboratorial samples for different CD.
- Supervisors Out-patient clinics and university hospital with great number of cases with several kinds of CD.
- Long-term cohort studies following patients with diverse chronic diseases.



Pre-clinical

- Collection of Genetically Engineered Models, including tissue specific, temporally activated, DREADS, CRISPR-Cas9 and zebrafish.
- Access to different platforms for drug screening and pre-clinical tests.
- Strong expertise in development of clinically relevant animal models and *in vitro* models for proof of concept tests.



Infrastructure

- Research laboratories and imaging facilities devoted to translational research. These include Microscopy Center, Next-generation medical scanning, Genomics, and Proteomics Facilities, Flow-citometry among others.
- Experience in management of Innovation, Intellectual Property and Business

We can also offer bread cheese and very good coffee!



Short, medium and long-term goals:

- Strengthen research capacity through **interdisciplinary integration** and **international cooperation**.
- Increase mobility: **Exchange of PhD students and Visiting Professors** both a junior and a senior profile as visiting professors at partner universities (66% of funding: outgoing) and **recruit postdoctoral fellows and early-career researchers** with experience abroad to work at UFMG within the PrInt themes and projects (34% incoming).
- To **attract internationally renowned visiting professors** with highly recognised experience for short stays (15 days) at UFMG
- Open up new avenues of collaboration through international cooperation: **reciprocity-based** relationship.
- Increase the number of PhD fellowships granted for Brazilian Students abroad. Strong focus on the **Joint PhD program**.
- Development of **new therapeutic and diagnostic strategies**
- Development of **new platforms for drug screening and biosensors** that are relevant for Chronic Disease research field.
- Development of **new models for Chronic Diseases**: humanized mice models, iPS cells.

Research topic – Infectious diseases

- **ICB** - *Brucella* spp (innate immunity and vaccines) / *S. aureus* (mechanisms in arthritis) / Bacterial pneumonia (mechanisms of disease) / Arboviral diseases (mechanisms, diagnosis) / Protozoa and parasites (molecular mechanisms)
- **School of Dentistry** - Immunopathology and microbiology of oral diseases (clinical)
- **School of Medicine** - Mycobacteria and dermatosis of social relevance / *Helicobacter pylori* and neuroendocrine pathology of digestive tract / Infectious and Tropical Diseases (clinical)
- **School of Pharmacy** - Diagnosis of infectious diseases

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- Univ. Southampton, Univ. Cambridge, Univ. d'Auvergne, Erasmus Univ. Rotterdam, Albert Einstein College of Medicine, Harvard Medical School, Univ. Complutense, King's College London, Univ. of Sheffield, Univ. Alberta, Univ. Nacional de Córdoba, Univ. Autónoma Nuevo León, Univ. Marobor, Liverpool School of Tropical Diseases, Univ. Barcelona, Mayo Clinic, Soubornne Univ., Mozambique, Angola and Cape Verde, NIH, Free Univ. of Berlin, Univ. Utah, Univ. Lille, Univ. East Anglia, Univ. Mexico, Leiden Univ. Medical Center, Institut Universitaire de Technologie en Génie, Queen Mary School, Univ. Chile, Univ. Wisconsin, Univ. California, Univ. Miami, Univ. Berkeley, CNRS-Orleans, INRA-Tours

Research topic – Cancer

- **ICB** - Development of new therapeutic strategies for cancer / Cancer genomics / Screening platforms for new drugs directed to cancer treatment / Role of PTX3 in tumors (mechanisms of diseases, pre-clinical studies)
- **School of Dentistry** - Oral neoplasias (clinical investigation)
- **School of Medicine** - Breast, penis and prostate tumors, onco-hematological disease (clinical investigation)
- **School of Pharmacy** - mechanisms involved in intestinal mucositis - employing Omega-3 fatty acids, probiotic, prebiotic and symbiotic as therapeutic agents (pre-clinical studies)

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG, Humbolt.
- King's College London, Univ. of Sheffield, Univ. Alberta, Univ. Nacional de Córdoba, Univ. Autónoma Nuevo León, Univ. Yale, Imperial College London, Duque Univ. Columbia Univ. Medical Center, Tohoku Univ., Oxford Univ., Università Bologna, Univ. California, McGill Univ., Univ. Toronto, Barrow Neurological Institute, Università degli Studi de Brescia, Humanitas Research Hospital, Humbolt, Centro de Bioproductos Marinos (Cuba), MIT.

Research topic – Neuronal-related diseases

- **ICB** - Schizophrenia and synaptic pruning using human iPSCs / Studies of Thiamine deficiency on Wernicke-Korsakoff's disease and during chronic ethanol treatment to explore brain excitatory and inhibitory circuits / Genetic epidemiology and Pharmacogenetics Obesity and Huntington / Potential Role of Renin-Angiotensin System in Non-Motor Symptoms of Parkinson's Disease / Neurodegenerative diseases: signaling pathways and therapies, Epilepsy; new therapies and new methodologies for seizure prediction
- **School of Medicine** - Disorders of neurodevelopment, neurodegenerative and psychiatric diseases, neuromyelitis optica (clinical investigation)
- **School of Music** - Music Therapy in Multiple Sclerosis, Neuromyelitis Optica, Cerebral Palsy, Tuberous Sclerosis, Mental Health, and Semantic Dementia.
- **School of Physical Education, Physiotherapy and Occupational Therapy** - Stroke and Cerebral Palsy

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- Columbia Univ. Medical Center, Max-Debrück Institute, Murdoch Children's Research Institute, Univ. California, Univ. Oxford, Univ. Auckland, Univ. Washington, Univ. Aalborg, Temple Univ., Univ. Toronto, Binghamton Univ., Mount Sinai

Research topic – **Neuronal-related disorders/Psychosocial disorders**

- **Department of Psychology** - Studies of the basic processes, such as attention and memory, language and symbolic behaviour in neurodevelopmental disorders / Studies of interventions for mental and neurocognitive disorders
- **ICB** - Cocaine abuse as an Accelerator of Cognitive Decline / Study of Inflammatory Biomarkers of Mood / Cognitive Disorders Following Traumatic Brain Injury, Epilepsy, Stroke (mechanisms and pre-clinical models)
- **School of Music** - Relationship between the therapeutic effects of improvisational music therapy and the musical development of children with autism

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG, CAPES/Swedish Foundation for international Cooperation in Research and Higher Education.
- McGovern Medical School, Univ. Western Ontario, Univ. Aalborg, Temple Univ., Univ. Toronto, Univ. Nicosia, Dare Institute, Univ. Minho, PUC Chile, Karolinska Institute, University of Pittsburgh, Harvard Medical School.

Research topic – Biomarkers/Diagnosis

- **ICB** - Nanotechnology based sensors for chronic disease diagnostic and treatment / Arboviral diseases
- **School of Medicine** - Molecular biomarkers of liver, biliary tree and pancreas cancers / Diagnosis of heart and endocrine diseases
- **School of Pharmacy** - Diagnosis and monitoring of various chronic diseases, particularly Diabetes mellitus, Chronic kidney disease, Neoplasias, Leukemias, Dyslipidemia, Lupus, Hypertension and Alzheimer's disease

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- Univ. Yale, Imperial College London, Duque Univ., Columbia Univ. Medical Center, Tohoku Univ., Oxford Univ., Universit  Bologna, Univ. California, McGill Univ., Univ. Toronto, Barrow Neurological Institute, Maastricht Univ., Michigan State Univ.

Research topic – **Obesity/Diabetes/Metabolic diseases**

- **ICB** - Clinical and basic sciences on obesity and atherosclerosis / Genetic epidemiology and Pharmacogenetics of Obesity / Development of new therapeutic strategies for diabetes / Natural products as a potential new source of therapy directed metabolic diseases (mechanisms, pre-clinical models, bioinformatics)
- **School of Pharmacy** - Clinical-pharmaceutical services, pharmacoeconomic and pharmacoepidemiological studies on diabetes
- **School of Physical Education, Physiotherapy and Occupational Therapy** - In a translational perspective the acute and chronic effects of physical exercise and it's association with nutritional interventions on cognitive and metabolic responses, have been studied on diabetes and obesity (clinical and experimental investigation)

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG, and Région Nord-pas-de Calais (France)
- Harvard Univ., Univ. Peruana Cayetano Heredia, Università degli Studi di Bologna, Univ. Extremadura, Univ. Pompeu Fabra, Instituto Nacional de Salud, Instituto Mexicano de Medicina Genomica, Univ. Chile, Université Lille, Universiteit Brussel- VUB.

Research topic – Cardiovascular diseases

- **ICB** - Role of Stem-Cells in Peripheral Arterial Disease in Humans and Experimental Models / iPS cells as a platform to model cardiac diseases / Central and peripheric mechanisms involved in hypertension control / Development of new therapeutic strategies for heart disease / Cholinergic dysfunction and cardiac disease / Natural products as a potential new source of therapy directed to hypertension (mechanisms, pre-clinical studies)
- **School of Medicine** - Epidemiology, diagnosis, physiopathology and treatment of heart diseases
- **School of Physical Education, Physiotherapy and Occupational Therapy** - Peripheral Vascular Disease and Cardiovascular Rehabilitation

Partners and funding agencies:

- CAPES, CAPES/COFECUB, CNPq, FAPEMIG, NIH
- Univ. Marobor, Liverpool School of Tropical Diseases, Univ. Barcelona, Mayo Clinic, Soubornne Univ., Mozambique, Angola and Cape Verde, NIH, Free Univ. of Berlin, Univ. Utah, Univ. Lille, Univ. East Anglia, Univ. Mexico, Leiden Univ. Medical Center, Institut Universitaire de Technologie en Génie, Harvard Medical School, University of Western Ontario, Humbolt, Université de Strasbourg, Max Delbrück Center, University of Akron, University of Vermont.

ICB – Biological Sciences Institute

- Nanotechnology formulations for the treatment of stroke
- Inflammatory bowel diseases: Identifying bacterial determinants involved in pro- or anti-inflammatory processes / Intestinal microbiota and immune system interaction in inflammatory diseases
- Metabolomic Analysis of Plasma of Patients with Different Clinical Forms of the Non-alcoholic Fatty Liver Disease / Genetic of alcoholism (candidate genes – *Lrrk2*)
- Study of Methylation Profile of the CpGs Dinucleotides in Individuals with Periodontitis on a Global Genome Scale
- Mechanisms associated to inflammation/resolution in Rheumatoid Arthritis / Chronic pulmonary inflammation / Liver diseases / Infections
- Customized, evidence-based medicine for American populations, Healthy aging (Bioinformatics)

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- McGovern Medical School, McGill Univ., Univ. Texas, Univ. North Carolina, INRA, NIH, Univ. California. Queen Mary School, KU Leuven, Humanitas University, Università degli Studi di Milano, Univ. Strasbourg, Melbourne Univ., Max Plank Institute, Univ. La Plata, Univ. Essex, Univ. California, Univ. Maastricht, University of Pittsburgh, Yale University.

School of Dentistry

- Dental caries
- Periodontitis
- Bruxisms
- Oral aspects of sleep disorders
- Oral cysts

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- King's College London, University of Sheffield, University of Alberta, Universidad Nacional de Córdoba, Universidad Autónoma Nuevo León
- University Portsmouth, Harvard Medical School, McGill University, McMaster University, University of Pretoria

School of Medicine

- Disorders of hemostasis and thrombosis
- Regulatory mechanisms and mediators of systemic inflammatory response
- Congenital and acquired immunological disorders / organ and tissue transplantation / glaucoma, retinopathies
- Epidemiology, diagnosis, physiopathology and treatment of heart and endocrine diseases
- Non-transmissible chronic and occupational diseases and their socioeconomic, biological, behavioral, psychosocial and environmental factors – guidance for public healthy actions

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- Univ. Marobor, Liverpool School of Tropical Diseases, Univ. Barcelona, Mayo Clinic, Soubornne Univ., Mozambique, Angola and Cape Verde, NIH, Free Univ. of Berlin, Univ. Utah, Univ. Lille, Univ. East Anglia, Univ. Mexico, Leiden Univ. Medical Center, Institut Universitaire de Technologie en Génie, Univ. Yale, Imperial College London, Duque Univ. Columbia Univ. Medical Center, Tohoku Univ., Oxford Univ., Università Bologna, Univ. California, McGill Univ., Univ. Toronto, Barrow Neurological Institute

School of Music

- Translation and Validation of the Nordoff Robbins Scales: "Child Therapist Relationship in Coactive Musical Experience" and "Musicability, Forms of Activity, Stages and Qualities of Engagement"
- Relationship between the therapeutic effects of improvisational music therapy and the musical development of children with autism
- Music Therapy in Inclusive Musical Education: a multicentric study
- Music, Music Therapy and Mental Health: Fundamentals, Processes and Evaluation
- Validation of a protocol for the evaluation of preterm infants in relation to sound stimuli

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- Univ. Aalborg, Temple Univ., Univ. Toronto, Multicentric Study in Brazil, Portugal and Denmark.

School of Pharmacy

- Intestinal inflammatory disease with emphasis on colitis (mechanisms of disease, pre-clinical models)
- Innovations in the treatment of chronic ocular diseases (uveitis, toxoplasmosis, glaucoma, diabetic retinopathy and age-related macular degeneration)
- Molecular, cellular and epidemiological aspects of diseases, with perspectives of application in diagnosis, prognosis and/or therapeutics
- Clinical-pharmaceutical services, pharmacoeconomic and pharmacoepidemiological studies of patients with chronic diseases (diabetes, rheumatoid arthritis, dyslipidemia, HIV-AIDS, hypertension, chronic obstructive pulmonary disease and viral hepatitis).

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG
- Maastricht Univ., Michigan State Univ., Univ. Texas, Pierre and Marie Curie Univ., Univ. Porto, Rovira I Virgili Univ., The Catholic Univ. of Porto, Paris Descartes, Univ. California, Univ. New South Wales, McGill Univ., Univ. Autònoma de Barcelona, Univ., Pompeu Fabra, Univ. San Jorge, National Prescribing Service, Univ. Strathclyde

School of Physical Education, Physiotherapy and Occupational Therapy-

- Musculoskeletal: Low Back Pain and Overuse Sports Injury
- Respiratory: Chronic Obstructive Pulmonary Disease *and* Idiopathic Pulmonary fibrosis
- Pediatrics: coordination disorders in preterm infants
- Exercise, cognition and diabetes/obesity

Partners and funding agencies:

- CAPES, CNPq, FAPEMIG and Région Nord-pas-de Calais (France).
- University of Sydney (Australia)/Université de Montréal (Canada), Columbia University and Boston University (USA), University de Sydney (Australia)/VU University Medical Center (The Netherlands), University of Sydney and La Trobe University (Australia)/McGill University (Canada), McMaster University (Canada), Université Lille, Universiteit Brussel- VUB.

Concluding remarks for the project on **CHRONIC DISEASES**

- Strong existing competencies and expertise in the field of Chronic Diseases at UFMG
- Cases of success already exist, such as technologies related to innovative drugs for treatment of chronic diseases transferred to Brazilian pharmaceutical industries. But still isolated cases of success
- UFMG researchers have great experience in collaborating with foreign universities and research institutions

Presentation schedule

- University of Queen Mary University of London
- INRA: Institut national de la recherche agronomique
- University of Warwick
- University of Sheffield
- KU Leuven-Rega Institute
- Universidade de Lille