Università degli Studi G. d'Annunzio di Chieti-Pescara

Department of Medicine and Aging Sciences

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Department of Medicine and Aging Sciences

The Department of Medicine and Aging Sciences is composed by clinician and biomedical personnel working together by integrated approach.
It aims to sustain research on Biology of aging and health and longevity for successful aging, promoting a better framework by biomedical aspect of pure etiological research and to purpose new pharmacological interventions.
The main research themes are the investigation of

i) biomarkers and mechanisms of onset and progression of chronic diseases,
ii) frailty,
iii) neurological aging, and
iv) maintenance of health and motor and cognitive function.

It has available clinical structures, laboratories and facilities to cover all phases of pre-clinic research and clinical trials.

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Personnel

The Department hosts 23 Full Professors, 31 Associate Professors, 21 Researchers and 2 Technicians.

The personnel is composed by:

9 internal medicine specialists
6 morphologists
5 endocrinologists
5 biologists
4 ophtalmologists
4 pediatricians
3 histologists
3 psychologists
3 sport psychologists
3 sport scientists
3 anthropologists
3 orthopedics
3 pathologists
2 physiologists
2 ginecologists
2 infectious diseases specialists
2 pedriatic surgeons
2 nephrologists
2 dermatologists
1 gastroenterologist
1 hygienist
1 haematologist
1 general surgeon
1 nutritionist
1 legal medicine specialist
1 occupational therapist
1 neurologist
1 cardiologist

Teachings

1st Cycle Degree:
CARDIOCIRCULATORY AND CARDIOVASCULAR PERFUSION TECHNIQUES
HEALTH ASSISTANCE
MIDWIFERY
NURSING
ORTHOPTIC AND OPHTALMOLOGIC ASSISTANCE
PHYSICAL ACTIVITY AND SPORT SCIENCES

2nd Cycle Degree:
NURSING AND MIDWIFERY SCIENCES

Single Cycle Degree 6 years:
MEDICINE AND SURGERY

PhD Degree:
TRANSLATIONAL MEDICINE

Research Topics

Age-related diseases: optimization of physical exercise prescription (i.e. frequency, intensity, typology, time, volume, progression, setting) for primary, tertiary and quaternary prevention of the main non-communicable chronic diseases. Research on pathophysiology of pain, cardiovascular risk, arterial hypertension, heart failure, dyslipidemia, diabetes, obesity, oxidative stress, visceral and musculoskeletal pain, fibromyalgia, headaches, haemostasis and thrombosis.

Inflammation & Immunology: study of the immune system in different clinical settings (antigen specific T-cells, T regulatory cells in Alzheimer disease, COVID19 etc.). Experience in the various viral and bacterial Infectious diseases, in the last two years he has gained particular experience in the management of COVID patients in the acute phase and in LONG COVID. Study of the hormonal regulation of the major histocompatibility complex (MHC) class I and its role in endocrine autoimmunity. Morpho-functional characterization of human lymphocyte subpopulations in young and elderly subjects. Morpho-functional characterization of human lymphocyte subpopulations in trained and sedentary subjects.

Musculoskeletal: muscle fibers/cells contracts, relax, produce energy, and adapts to exercise, disuse and ageing by changes in intracellular Ca^{2+} levels that are finely modulated by excitation-contraction (EC) coupling or store-operated calcium entry (SOCE). Research on patho-physiological mechanisms underlying myopathies caused by mutation/dysfunction of proteins involved in EC coupling and SOCE focusing on identification and characterization of the sites of Store-operated Ca^{2+} Entry; investigation on the communication between Ca^{2+} release units and mitochondria; on the link between malignant hyperthermia susceptibility (MHS) and exertional-environmental heat stroke (EHS), and on the role of STIM1 and Orai1 in the formation of tubular aggregates (TA) in ageing and TA myopathy (TAM). Use of transgenic/knock-in/knock-out mouse models and human biopsies with structural and functional techniques ranging from electron microscopy, confocal imaging, to biochemistry, in vitro measurements of muscle contractile properties, behavioral measures of in vivo muscle performance (treadmill, grip strength), and indirect calorimetry.

Endocrinology: study of the expression of thyroid-specific genes in thyroid cells and the pathologic role of endocrine disruptors on it. Newborn screening for congenital endocrine and metabolic diseases. Role of TSH receptor antibodies in thyroid autoimmunity.

Metabolics: characterization of endothelial cells harvested from cords of pregnant women affected by gestational diabete. Real world evidence regarding efficacy, safety and adherence to therapies for diabetes treatment with proven cardiovascular benefit: GLP-1 receptor agonists (GLP-1RAs) and SGLt2i. Treament of obesity and metabolic alterations with low carb, high fiber, low calorie diet (using low carb, high fiber foods) or with GLP1-RAs. Phase II and Phase III RCT on drugs for diabetes treatment.

Research Topics

Neuroscience: dementia and associated movement disorders are disabling degenerative diseases in which cognitive abilities decline over time. Early diagnosis of dementia appears essential to any successful neuroprotective strategy. The identification of specific and early biomarkers of the different forms of dementia can guarantee the definition of the most appropriate therapeutic approaches. The identification of new biomarkers through neurophysiological and imaging techniques could be crucial to arrive at a differential diagnosis of dementia, but also to open a window on the period preceding the onset of cognitive deficits. Research activity, which boasts collaborations with various Dementia Centers in Europe and the USA and which has received substantial funding from National (Finalized Research of the Ministry of Health, Interceptor call), European (JPND, IMI call), and from industry (Mentis cura srl, Oslo) through the combined use of neurophysiology, advanced magnetic resonance techniques, such as fMRI, MRI Spectroscopy (1H-MRS) and Diffusion Tensor Imaging (DTI), and analysis on samples biological (saliva, blood and cerebrospinal fluid) has two main objectives:
1. Identify markers able to improve the differential diagnosis between different forms of dementia but linked by similar clinical pathological aspects;
2. Identify markers that can contribute to an early diagnosis of different pathologies.

Cardiology: histological, immunohistochemical and ultrastructural studies on myocardial biopsies to investigate the immunopathological mechanisms driving acute and chronic cardiac rejection.

Ophtalmology: retina - multimodal imaging of retinal diseases, microRNA modifications in patients with diabetic retinopathy and diabetic macular edema undergoing intravitreal treatment with anti-VEGF and dexamethasone impalnt, changes in the microRNAs of aqueous humor and vitreous humor in patients with retinal detachment. Proteomics of aqueous humor and vitreous humor in patients with medical and surgical retinal diseases. Innovative laser treatments in retinal diseases, deep learning in the study of the OCT biomarkers of diabetic macular edema. Cornea - surgical therapy of keratoconus and development of additive corneal transplantation techniques assisted by robotics. Engineering of corneal lenticule for the purpose of delivering innovative therapies. International collaboration for the bioengineering construction of an artificial corneal organoid. Glaucoma - tear proteomics in the risk of glaucoma progression, deep learning in the study of the draft function.

Research Topics

Oncology: histopathological, cellular and molecular biology studies (laser microdissection on frozen tissue sections, cell line and stem cell cultures, real-time qPCR and gene sequencing) to investigate cellular, molecular and immunological mechanisms underlying the metastatic process in prostate, breast, colon and lung cancers. Histopathological and molecular biology studies, on human tissues and experimental murine models, in the field of tumor immunology. The expression of immune-check point molecules and immunosuppressive mediators, which favor tumor immune escape and metastasis development, is particularly investigated to develop targeted therapies by using nanotechnology and genomic editing techniques (CRISPR/Cas9 technology). Histopathological and molecular biology studies to analyze the anti-tumor mechanisms induced by the administration of vaccines consisting of neoplastic cells expressing immuno-stimulating molecules (IL-12, LAG-3/CD223, IL-21) in pre-clinical models of breast cancer. Study of the role of specific PLC isoforms, both cytoplasmic and nuclear, in promotion and/or progression of breast cancer. Integrative treatments for breast cancer survivors. Characterization of normal and neoplastic lymphoid cells: mechanisms of transduction of cell signals. Characterization of normal and neoplastic lymphoid and erythroid cells: morphological and functional study of the nucleus and cell cycle.

Human stem cells: cellular reprogramming (induced pluripotent, iPS), generation of brain organoids (minibrain), spinal motor neurons, dopaminergic neurons, myocardiocytes, adipocytes, myocytes (skeletal muscle). Modeling of pathologies (neurodegenerative and cardiac), toxicity studies (drugs, chemicals, pollutants, etc.) and killing of tumor or infected cells. Regenerative potential and negative immunomodulatory abilities of mesenchymal stem cells (MSCs). Study of Circulating endothelial cells (CEC) and their progenitors (EPC) as potential biomarkers in several clinical conditions involving endothelial turnover/remodeling. Morpho-functional analysis of adult and perinatal stem cells (satellite cells, amniotic fluid stem cells, amniotic epithelial cells) and their regenerative differentiative potential. Structural, ultrastructural and molecular study of bone regeneration induced by bone substitutes and amniotic fluid stem cells. Studies on the biological effect of biomaterials on fibroblasts and dental pulp stem cells. Mapping of the human placenta under physiological and pathological conditions.

Senescence: morpho-functional analysis of senescence in different cell type. Investigation of senescence inducing mechanisms to identify natural or synthetic molecules as new therapeutic agents.

Research Topics

Bio-Nutraceutical: deep knowledge on the molecular pathways involved in the onset and progression of inflammatory diseases with the aim of defining new biomarkers for the development of innovative therapeutic/diagnostic strategies. Testing on validated experimental models, the biological and pharmacological activity of biomolecules and substances of natural origin directed on specific molecular pathways involved in the modulation of the cellular redox state. Through Italian and foreign collaborations, development and test of liposomal vesicles containing natural compounds with anti-inflammatory and antioxidant action for a targeted administration towards the affected area.

Molecules: study of lipid dependent-signal transduction pathways during cell growth and differentiation. Analysis of the mechanisms of cell proliferation and differentiation induced by physical agents (ionizing radiation, hypoxia) and chemical agents such as cytokines (TNF, TRAIL), drugs (GnRH agonists and antagonists) and differentiating agents (hemin, DMSO, insulin).

Extracellular vesicles: study of circulating extracellular vesicles (EVs) as potential biomarkers in several clinical conditions (cardiovascular, neurological, oncological, gastroenterological diseases etc.).

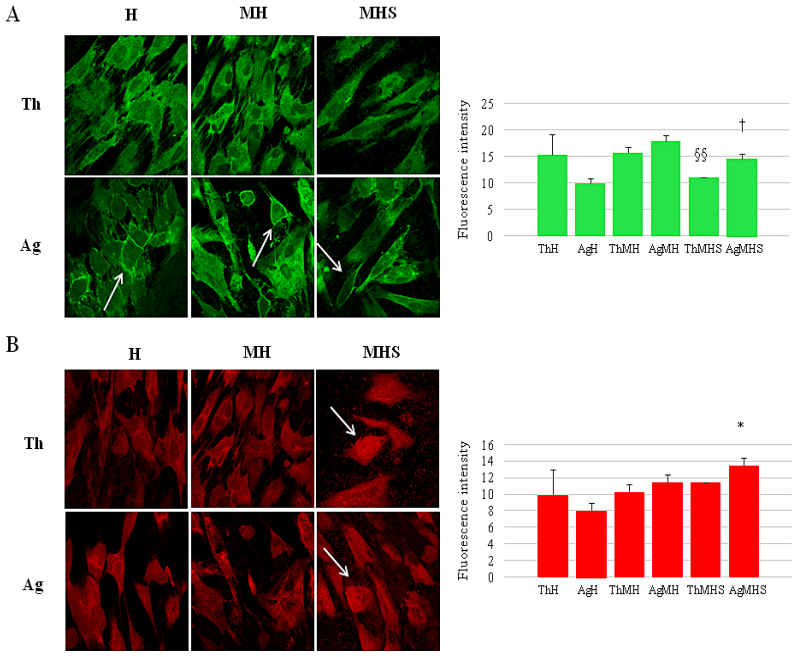
Methods: study of polychromatic flow cytometry (FCM) and molecular biology techniques.

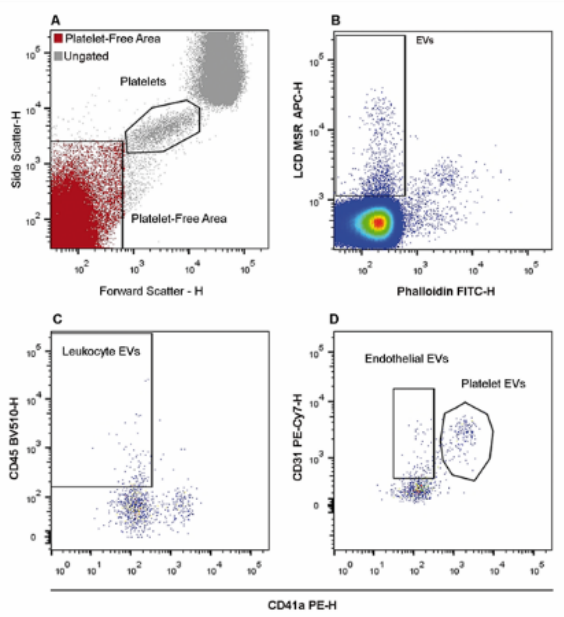
Materials: studies on the biocompatibility of dental materials and control of interactions with microorganisms in the environment through the development of co-cultures between eukaryotic cells and prokaryotic cells.

Environmental toxicity: biological effect of MP on different tissues.

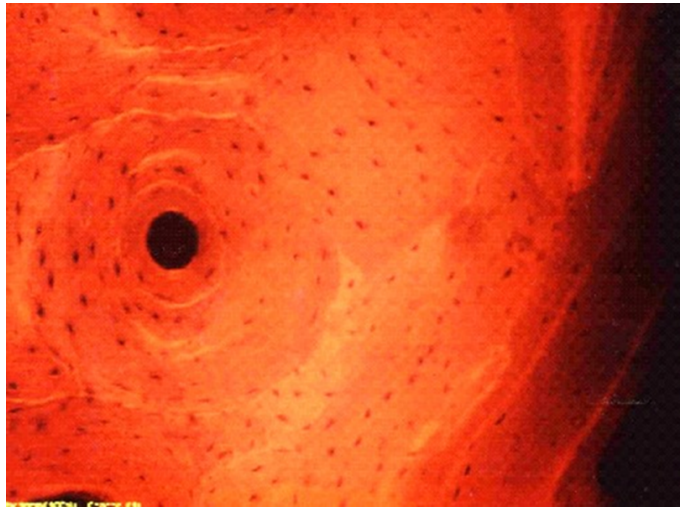
Anthropology: study of biological anthropology in ancient human remains from archaeological and paleoanthropological contexts. Study of paleopathology evaluating the origin and evolution of human and animal diseases and their interaction with man over the course of history. Study of paleohistology, evaluating the morphometric characteristics of the bone tissue of men and animals of the past. Study of forensic anthropology in evaluating human remains from forensic contexts for identification purposes.

Research Topics





Circulating Extracellular Vesicle Analysis and Subtyping



Human remains and Bone section of human remains from Hercolaneum (79 d.C.)

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Labs and Facilities

Center for Advanced Studies and Technology (CAST) Facility: this facility is located at the Campus of the University of Chieti. It is recognized as a Center of Excellence on Aging and Translational Medicine and provides common technical space as well as lab space dedicated to the single Work Units.

Clinical Research Center (CRC) Unit: this Clinical Unit is located at the CAST and is devoted solely to in vivo investigation in humans. The Unit extends over an area of about 2000 square feet with both outpatients and inpatients facilities. It has 4 rooms, for a total of 8 inpatient beds and 3 medical offices for outpatient clinic. It has its own lab for specimens processing, an internal independent pharmacy, dedicated fridge space for investigational drugs storage and dedicated freezer space for specimen storage. Clinical tests and exams available at the CRC are Ergometric Stress Test (EST), Ultrasonography, Flow Mediated Dilation Assessment, Indirect Calorimetry, Bioelectric Impedance Analysis, Insulin Clamp Technique, Evoked Potentials Assessment. Routine lab work can be performed at the nearby University Hospital Clinical Lab. Medical Investigators at the University of Chieti-Pescara have admitting privileges with the CRC, where they can admit and/or visit patients enrolled in Clinical Studies once the study has been approved by the local Ethical Committee and funding for the study has been approved. Patients enrolled in such clinical studies are followed by the study Investigators under the supervision of the CRC Medical Director and with the help of the CRC Nurse Coordinator. Additional nurse support is available on demand as requested by the study project.
In the same facility the Operative Unit has also the Regional Laboratory for Newborn Screening for Endocrine and Metabolic Diseases (in collaboration with Biochemistry and Proteomics Laboratories) as well as laboratories where experiments of molecular biology are performed.

Labs and Facilities

Geriatric Clinic: it is located at Clinical hospital «SS. Annunziata» of Chieti.

Infectious Disease Clinic: this clinic has experience in the various viral and bacterial Infectious diseases, in the last two years he has gained deep experience in the management of COVID-19 patients in the acute phase and in LONG COVID. It is located at Clinical hospital "SS. Annunziata" of Chieti.

Ophthalmology Clinic (CNAT - National High Technology Center in Ophthalmology): it is located at Clinical hospital "SS. Annunziata" of Chieti.

Dementia and Movement Disorder Clinics: Unit 1 includes a Dementia and a Movement Disorder Center, with 1500 referrals, serving a population of 1200.000. The PI of Unit 1 has recognized expertise in DLB studies (including coordination of two projects on Dementia with Lewy bodies LB funded by the Italian Ministry of Health: GR 2007 and 2010, RF2018) . She is in the board of the European-DLB consortium and of the Professional Interest Area (PIA) ISTAART on DLB, on the board of the international Frontotemporal dementia network and leads the electrophysiology section of the E-DLB and the prodromal DLB section of PIA ISTAART. The Unit is endowed with an electrophysiology laboratory with high expertise in advanced technology and advanced mathematical analysis methods, MRI (3T), SPECT/PET.

Labs and Facilities

Physiology and Physiopathology of Striated Muscles Unit: Electron Microscopy (EM) Laboratory (~1oo square feet): located in the basement of CAST, is equipped with a Philips Morgagni Series 268D and consists of: a) a room for the electron-microscope; b) an office for researchers/post-docs (~175 square feet), equipped with two work stations; c) a main lab-space with 3 lab-office carrels with computers, for Ph.D. students and technicians; d) a sectioning room with ultra-microtome and fluorescent microscope; and e) a room for chemical reagents. Biochemistry Laboratory (~180 square feet) is located on the second floor of CAST and is equipped with a chemical hood and has a lab-office carrel with computer to be used by personnel working in the room. Laboratory of Physiology in-vivo (215 square feet) is located at the basement of CAST, in proximity of the Animal Facility and is completely dedicated to in-vivo testing of animal models (treadmill, environmental chamber, grip test, indirect-calorimetry system).

Biomorphology Unit: Reprogramming and Cell Differentiation Laboratory; Cell Biology and Functional Histology Laboratory; Cytomorphology Laboratory (40 mq, CAST); Flow Cytometry Core Facility (40 mq, CAST); Aging Cell Laboratory; Natural compounds and new molecular pathways in inflammation diseases Laboratory.

Anthropology Unit: Osteometry Laboratory and Bone Histology Laboratory.

Anatomic Pathology Unit: Anatomic Pathology and Immuno-Oncology Laboratories (CAST). Animal Facility with all devices required for both fully immunocompetent and immunodeficient mice breeding is also available at CAST.

Endocrine Unit: Endocrinology Laboratory.

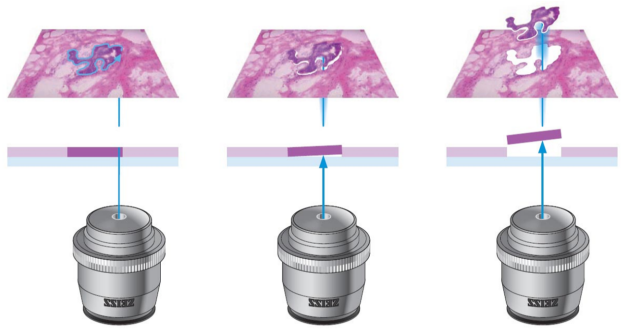
Human Movement Unit: Integrated Medicine Laboratory; Gims.

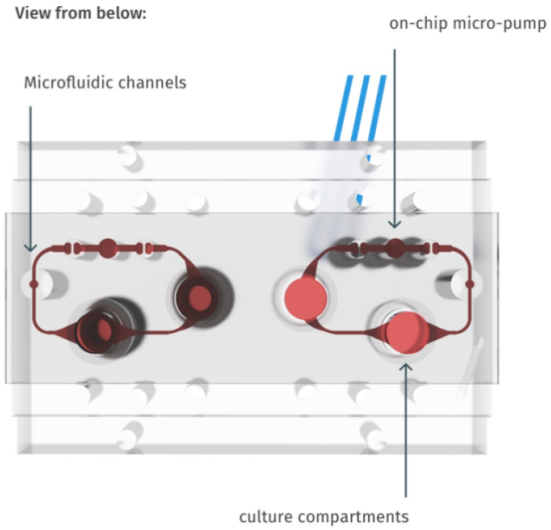
Equipment

- **EVOS M7000 Microscope** (Thermo Fisher Scientific): fully automated, inverted, multi-channel fluorescence and transmitted light imaging system; equipped with an incubator with temperature, gas (normoxic or hypoxic conditions) and humidity control for in vivo and time-lapse imaging for morphological analysis and high content Imaging.
- **Zeiss Axioskop 40 Light Microscope** equipped with a Coolsnap Videocamera (Photometrics), and MetaMorph 6.1 Software System (Universal Imaging Corp, Molecular Device Corp, CA, USA) useful to acquire digital images and perform morphometric analyses.
- **Zeiss AxioVert A1 Microscope** (Zeiss) is a multi-channel fluorescence imaging system, equipped with image analysis software (ZEN).
- **Zeiss-109 Transmission Electron Microscope** is equipped with a Gatan 830Z00W44 videocamera and Digital Micrograph application useful for acquiring, visualizing, analyzing, and processing digital images data (Gatan GmbH, Ingolstadterstr. 12, D-80807 München, Germany).
- **Celleste Image Analysis software** (version 5.0) (Thermo Fisher Scientific) for image analysis. Includes 2D and 3D deconvolution modules for advanced image analysis such as 3D cell culture (organoids, embryonic bodies).
- **Cryostat Microtome CM1860** (Leica): latest generation cryosection technology for immunofluorescence and immunohistochemistry analyses.
- **RMS-16G3 microtome** (Reha-Tech Engineering) is a diamond-edged circular blade microtome which is able to perform histological sections of ancient and fossil bones and teeth directly, without demineralizing the samples.
- **Ultra-microtomes** (Leyca)
- **Varioskan lux plate reader** (Thermo Fisher Scientific) for absorbance, fluorescence intensity, luminescence, AlphaScreen and time resolved fluorescence (FRET).
- **Nucleofector 4D** (Lonza) equipped with the X and Y Unit to effectively transfect cells both in suspension and in adhesion for molecular analysis.
- **Maestro Edge** (Axion) platform for Microelectrode Array (MEA) that record and analyze electrical activity from cardiomyocytes or neurons in real time. Impedance measurement, enabling real-time tracking of cell growth and testing for cytotoxicity of chemical compounds (functional analysis).

Equipment

- **P.A.L.M. Micro Beam System** (P.A.L.M. Microlaser Technologies, Bernried, Germany) is used to isolate cell populations or single cells on frozen tissue sections. These cells can be subsequently analyzed by means of molecular biology techniques (real-time RT-PCR, genome or transcriptome sequencing).
- **TissUse's HUMIMIC Organ-on-a-Chip System** (TissUse GmbH, Berlin, Germany) is a multi-channel 3-D microfluidic cell culture device that simulates the activities, mechanics and physiological response of entire organs on a 76 mm wide chip. This next generation *in vitro* model of human organs allows to investigate disease mechanisms and evaluate drug efficacy and toxicity.
- **Dolomite Nanoparticle System** (Dolomite Centre Ltd, Royston, UK) is a complete microfluidic system which can efficiently generate lipid particles with precise control over their dimensions (<1% of variation), suitable for both *in vivo* experiments and clinical applications.
- **Qiagen Rotor-Gene Q** (Qiagen, Hilden, Germany), a real-time PCR cycler optimized for pathway-focused gene expression analysis using RT2 Profiler PCR Arrays, which also allows to carry out DNA methylation analysis and miRNA search;
- **Cytoflex S flow cytometer** (Becton Dickinson), certified for the detection of exosomes and microparticles for phenotypic analysis.
- **Cytoflex** (Beckman Coulter)
- **FACS CANTO II Analyser** (BD Biosciences) CE IVD for Diagnostics.
- **FACS Verse Analyser** (BD Biosciences)
- **FACS Aria III Fluorescence Activated Cell Sorter** (BD Biosciences)





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Equipment

- **System for functional studies in muscles** (Aurora Scientific): Indirect Calorimetry System (Panlab); Treadmill for mice (Columbus Instruments); Mouse Running Wheels for voluntary activity (Columbus Instruments); Environmental chamber (custom made).
- **YSI Analyzer** for measurements of glucose in whole blood, plasma or serum; and of L-lactate in whole blood, plasma, or cerebrospinal fluid.
- **Fully automated integrated screening plate processor** for time-resolved immunofluorometric assays of hormones, metabolites and enzymes.
- **Anthropometric kits.**
- **Electrical Bioimpedance.**
- **Multisensory devices** to monitor, record and detect physical activity, physical exercise and sleep characteristics, **cardio**, **strength**, **gimnastic tools**.
- **Corneal and crystalline lens femtosecond laser.**
- **Optical coherence tomography angiography.**
- **Retinograph.**
- **Angiograph.**
- **Anterior segment optical coherence tomography.**
- **Topography.**
- **Microperimeter.**

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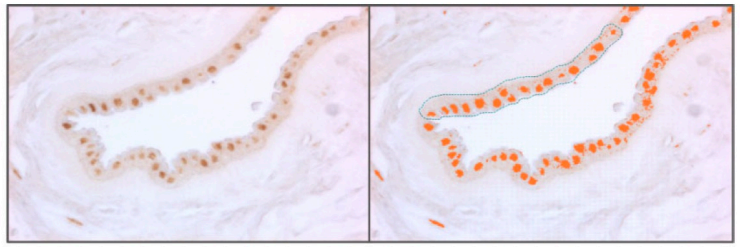
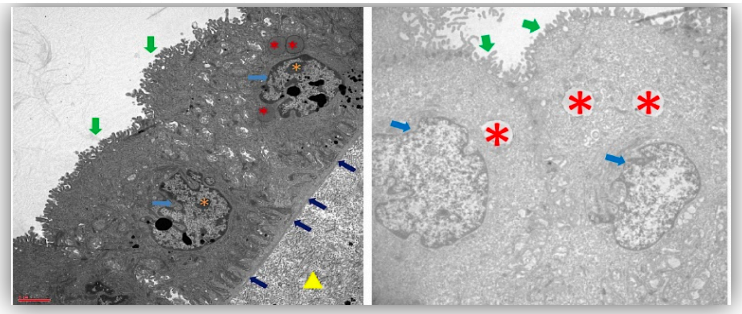
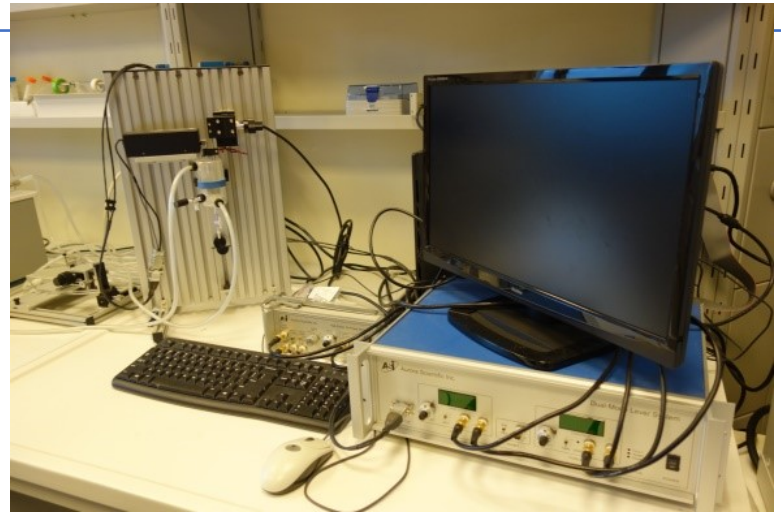
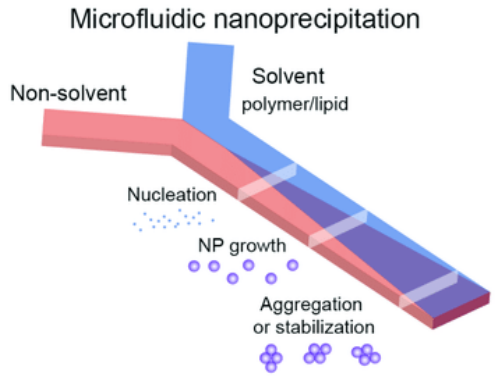
Equipment









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Partnership and Collaborations

INTERNATIONALS (1)

- **Harvard Medical School,** Initiative for RNA Medicine (Prof. Di Ruscio), Boston, MA, USA
- **Columbia University**, Department of Biomedical Engineering (Prof. Corneo), 2920 Broadway, New York, NY, USA
- **Mount Sinai, School of Medicine**, Tisch Cancer Center, Division of Hematology/Oncology (Prof. Migliaccio), New York, NY, USA
- **Mount Sinai, School of Medicine**, Department of Cell, Developmental, and Regenerative Biology (Prof. Blenkinsop), New York, NY, USA
- **Institute of Animal Physiology and Genetic Research**, AFRC, Biochemistry Department (Director Prof. Robert S. Gilmour), Cambridge, UK
- **Hebert Medical School**, Uniformed Services University of the Health Sciences (USHUS) (Prof. Phil M. Grimley, F. Edward Bethesda), MD, USA
- **University of Connecticut Health Center**, Department of Reconstructive Sciences (Prof. Ivo Kalajzic), 06030 Connecticut, USA
- **Klinikum der Universität Regensburg und Medizinische Fakultät** (Prof. Helmut Schweikl), Regensburg, Germany
- **University of New South Wales**, Inflammatory Diseases Research Unit, School of Medical Sciences (Prof. Nick Di Girolamo), Sydney, NSW 2052, Australia
- **Gentofte Hospital** (Prof Knop), Hellerup, Capital Region of Denmark, DK
- **Roswell Park Cancer Institute (RPCI)**, Department of Immunology (Prof. Scott I. Abrams), Buffalo, NY, USA
- **Center for Microbiome Innovation and Moores Cancer Center**, Division of Biological Sciences, University of California (Prof. Li-Fan Lu), San Diego, CA, USA.
- **Biomedical Translational Research Institute**, Key Laboratory of Molecular Immunology and Antibody Engineering (Prof. Zhinan Yin), Jinan University, Guangzhou, China.
- **Singapore National Eye Center – University of Nottingham UK**, International Research Project on Stromal lenticule Bioenginelization as potential biocompatible ocular drug delivery system.

Partnership and Collaborations

INTERNATIONALS (2)

- **Masaryk University,** Department of Neuroscience, Brno, CZ
- **Lyubliana University,** Department of Neuroscience, Lyubliana, SL
- **University of Cincinnati,** Movement Disorder Department, Cincinnati, OH, USA
- **Mayo Clinics,** Department of Neurology, Rochester, USA
- **University of Newcastle,** Department of Aging, Newcastle u.t., UK
- **Goteborg University,** Goteborg, Sweden
- **University of Strasbourg,** Department of Aging, Strasbourg, FR
- **University of Stavanger,** Norway
- **Mentis cura srl,** Oslo, Norway
- **Philadelphia College of Osteopathic Medicine,** Prof. Arturo Bravo Nuevo,
- **University of Granada,** Prof. José Luis Quiles Morales, Director of the Universitary Institute "José Mataix Verdú" Institute of Nutrition and Food Technology (INYTA), Granada, Spagna
- **Oslo University Hospital Rikshospitalet,** Research Institute of Internal Medicine, Sognsvannsveien 20, 0372 Oslo, Norway
- **University Hospital Zurich,** Department of Cardiology, 8091 Zurich, Switzerland
- **Karolinska Institute,** Department of Neuroscience, Stockholm, Sweden
- **Karolinska University Hospital,** Cardiology Unit, Department of Medicine Solna, Stockholm, Sweden

Partnership and Collaborations

NATIONALS

- **Microscopy Center of the University of L'Aquila** for microscopic and microanalytical analyzes, L'Aquila, AQ, Italy.
- **University of Ferrara,** Department of Morphology and Embryology (Prof. Giorgio Zauli, Prof. Paola Secchiero), Ferrara, FE, Italy.
- **University of L'Aquila, Department of Surgical Sciences** (Director Prof. Marco Ciancaglini), L'Aquila, AQ, Italy.
- **Catholic University of Sacro Cuore**, Institute of Histology and Embryology (Director Prof. Gigliola Sica), Roma, Italy.
- **Research Center for Regenerative Medicine** (CROME) (Director Prof. Ornella Parolini), Policlinico A. Gemelli, Roma, Italy.
- **University of Palermo**, Department of Surgical, Oncological and Stomatological Sciences (DICHIRONS), Prof. G Stassi, Palermo, Italy.
- **National Institute for Public Health (ISS)**, Section of Experimental Carcinogenesis (Dr. P. Pichierri and Dr. M. Bignami), Rome, Italy.
- **University of Bologna**, Department of Experimental, Diagnostic and Specialty Medicine (DIMES) (Prof. P.L. Lollini), Bologna, Italy.
- **Logistica Food srl** Manoppello (PE).
- **Coresearch srl,** Pescara.
- **Sapienza University**, Neurology Department, Rome, Italy
- **Sapienza University**, Physiology Department, Rome, Italy
- **Brescia University**, Department of Neurology, Brescia, Italy
- **Genova University**, Department of Neurology, Genova, Italy
- **Besta Neurology Institute**, Milano, Italy

Partnership and Collaborations

Prof Cecilia Söderberg-Naucler

Prof Edwin van der Pol

Prof Florian Kern

Prof. Arturo Bravo Nuevo

Ing. Enrico Rovida

Prof. Alfredo Budillon

Prof. Franco Locatelli

Centro di Biologia Integrata dell'Università di Trento (CIBIO)

Prof. Stefano Papa

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Partnership and Collaborations

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Grants and Fundings

Grant #1: 2019-2023, Intestinal inflammation and development of colorectal cancer: the role of innate immunity and perspectives for immunotherapeutic interventions **PRIN 2017**, Ministero dell'università e della Ricerca. The overall goal of the Research is to identify the innate immunity pathways involved in the pathogenesis of Inflammatory Bowel Disease (IBD), and its transition to Colorectal Cancer (CRC), to determine biosignatures that will enable targeted and early interventions to prevent CRC development. OPERATIVE UNIT COORDINATOR, Prof. Emma di Carlo.

Grant #2: 2019-2023, "The Incretin Hormones and their analogues as physiological and pharmacological regulators of a complex multi-organ network". **PRIN 2017**, Ministero dell'Università e della Ricerca, euros 163.279. 3 Years – PROCOLLO 2017CPLH32 (periodo 29/8/2019 - 28/02/2023) Agostino Consoli. National Coordinator.

Grant #3: 2019, PD-MIND IMI project. Italian PI Prof. Laura Bonanni. 2.158.415 euros.

Grant #4: 2014-2020, Valorizzazione e caratterizzazione biofunzionale dei petali di Crocus Sativus (zafferano) e possibile uso nella terapia antiinfiammatoria delle MICI. **PON FSE-FESR Ricerca e Innovazione 2014-2020 (FSC)** PI. Dott.ssa Federica De Cecco - Supervisor Prof.ssa Lorenza Speranza.

Grant #5: 2022, **PNRR Ecosistemi 2022** for the project: "TELEMEDICINE AND ENVIRONMENT: biomarkers in cardiovascular diseases and links with platelet activation".

Most representative papers

The Department has an intense and vaste repertory of publications:

- **Number of papers** published in the last 5 years: **~1.038**
- **Number of citations** in the last 5 years: **~11.115**

The 10 most important/representative publications of the last 5 years:

Paper #1: Perinatal Derivatives: Where Do We Stand? A Roadmap of the Human Placenta and Consensus for Tissue and Cell Nomenclature Silini, A.R., Di Pietro, R., Lang-Olip, I., ...Huppertz, B., Parolini, O. Frontiers in Bioengineering and Biotechnology, 2020, 8, 610544

Paper #2: Claudia Rossi, Paola Lanuti, Ilaria Cicalini, Domenico De Bellis, Laura Pierdomenico, Piero Del Boccio, Mirco Zucchelli, Luca Natale, Bruna Sinjari, Giulia Catitti, Simone Vespa, Pasquale Simeone, Giuseppina Bologna, Ines Bucci, Katia Falasca, Jacopo Vecchiet, Liborio Stuppia, Vincenzo De Laurenzi and Damiana Pieragostino BNT162b2 mRNA Vaccination Leads to Long-Term Protection from COVID-19 Disease Vaccines 2021, 9, 1164.

Paper #3: Bonanni, L., Thomas, A., Tiraboschi, P., Perfetti, B., Varanese, S., Onofrj, M. EEG comparisons in early Alzheimer's disease, dementia with Lewy bodies and Parkinson's disease with dementia patients with a 2-year follow-up (2008) Brain, 131 (3), pp. 690-705. Cited 231 times.

Paper #4: In Vivo evaluation of corneal nerves and epithelial healing after treatment with recombinant nerve growth factor for neurotrophic keratopathy. Mastropasqua L, Lanzini M, Dua HS, D' Uffizi A, Di Nicola M, Calienno R, Bondì J, Said DG, Nubile M.Am J Ophthalmol. 2020 Sep;217:278-286. doi: 10.1016/j.ajo.2020.04.036.

Paper #5: Myoinositol Reduces Inflammation and Oxidative Stress in Human Endothelial Cells Exposed In Vivo to Chronic Hyperglycemia. Baldassarre MPA, Di Tomo P, Centorame G, Pandolfi A, Di Pietro N, Consoli A, Formoso G. Nutrients. 2021 Jun 27;13(7):2210. doi: 10.3390/nu13072210.

Most representative papers

Paper #6: Boncompagni, S., C. Pecorai, A. Michelucci, L. Pietrangelo, F. Protasi. 2020. Long-Term Exercise Reduces Formation of Tubular Aggregates and promotes maintenance of Ca^{2+} Entry Units in aged muscle. Front. Physiol. 11: 601057.

Paper #7: Hormonal Regulation of the MHC Class I Gene in Thyroid Cells: Role of the Promoter "Tissue-Specific" Region. Giuliani C, Verrocchio S, Verginelli F, Bucci I, Grassadonia A, Napolitano G. Front Endocrinol (Lausanne). 2021 Dec 6;12:749609. doi: 10.3389/fendo.2021.749609.

Paper #8: McKeith, I.G., Boeve, B.F., Dlckson, D.W., Halliday, G., Taylor, J.-P., Weintraub, D., Aarsland, D., Galvin, J., Attems, J., Ballard, C.G., Bayston, A., Beach, T.G., Blanc, F., Bohnen, N., Bonanni, L., Bras, J., Brundin, P., Burn, D., Chen-Plotkin, A., Duda, J.E., El-Agnaf, O., Feldman, H., Ferman, T.J., Ffytche, D., Fujishiro, H., Galasko, D., Goldman, J.G., Gomperts, S.N., Graff-Radford, N.R., Honig, L.S., Iranzo, A., Kantarci, K., Kaufer, D., Kukull, W., Lee, V.M.Y., Leverenz, J.B., Lewis, S., Lippa, C., Lunde, A., Masellis, M., Masliah, E., McLean, P., Mollenhauer, B., Montine, T.J., Moreno, E., Mori, E., Murray, M., O'Brien, J.T., Orimo, S., Postuma, R.B., Ramaswamy, S., Ross, O.A., Salmon, D.P., Singleton, A., Taylor, A., Thomas, A., Tiraboschi, P., Toledo, J.B., Trojanowski, J.Q., Tsuang, D., Walker, Z., Yamada, M., Kosaka, K. Diagnosis and management of dementia with Lewy bodies (2017) Neurology, 89 (1), pp. 88-100. Cited 1565 times.

Paper #9: Simeone P, Tripaldi R, Michelsen A, Ueland T, Liani R, Ciotti S, Birkeland KI, Gulseth HL, Di Castelnuovo A, Cipollone F, Aukrust P, Consoli A, Halvorsen B, Santilli F. Effects of liraglutide vs. lifestyle changes on soluble suppression of tumorigenesis-2 (sST2) and galectin-3 in obese subjects with prediabetes or type 2 diabetes after comparable weight loss. Cardiovasc Diabetol. 2022 Mar 11;21(1):36. doi: 10.1186/s12933-022-01469-w.

Paper #10: Treede RD, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, Cohen M, Evers S, Finnerup NB, First MB, Giamberardino MA, Kaasa S, Korwisi B, Kosek E, Lavand'homme P, Nicholas M, Perrot S, Scholz J, Schug S, Smith BH, Svensson P, Vlaeyen JWS, Wang SJ. Chronic pain as a symptom or a disease: the IASP Classification of Chronic Pain for the International Classification of Diseases (ICD-11). Pain. 2019 Jan;160(1):19-27. doi: 10.1097/j.pain.0000000000001384.

Most representative projects

- "**Not Just Walking**". Primary, tertiary and quaternary prevention of non-communicable chronic diseases through healthy lifestyles. The project also includes the mapping and charaterization of paths in natural environments, near to public diabetic units in the Abruzzo region, useful for health.
  https://www.canva.com/design/DAEAFhgTRVY/b3Svod3_7bIgyxAL-3eYUQ/view?website#2:con-il-patrocinio-di

- "**Allenarsi per la salute**" and "**Allenarsi per la salute into the wild**". The projects are aimed to study the psychophysical effects of physical exercise characteristics and nature on breast cancer survivors health. The project "Allenarsi per la salute into the wild" also includes the mapping and charaterization of paths in natural environments, in the Abruzzo region, useful for health.
  https://www.canva.com/design/DAEEBtXVFgI/G15KxJVmCsE-594Mm-xv1g/view?website#2

Technological Transfer

FLOWFORLIFE LAB SRL
Spin-off of University «G. d'Annunzio», Chieti-Pescara

- **Screening of antibiotic residues in meet, egg, milk, honey and seafood samples (Antibiotic Safe Label)**
- **Probiotic and yeast viability analyses in Starters and Pharmaceutical formulation**
- **Brettanomyces contamination in wine samples**
- ***Salmonella, Listeria, Campylobacter, E. Coli, Anisakis* in food and water samples.**
- ***Xylella fastidiosa* contamination in olive tree samples**

National Patent: **PROPRIOCEPTIVE LUMBAR SUPPORT DEVICE** (Number 102022000013348)
Prof. Mirko Pesce (Co-Inventor), Prof. Antonia Patruno (Co-Inventor)

Technology Readiness Level

Cornea

- Surgical therapy of keratoconus and development of additive corneal transplantation techniques assisted by robotics;
- Engineering of corneal lenticule for the purpose of delivering innovative therapies;
- International collaboration for the bioengineering construction of an artificial corneal organoid.

Glaucoma

- Tear proteomics in the risk of glaucoma progression;
- Deep learning in the study of the draft function.

Retina

- Multimodal imaging of retinal diseases;
- Proteomics of aqueous humor and vitreous humor in patients with medical and surgical retinal diseases;
- Innovative laser treatments in retinal diseases;
- Deep learning in the study of the retinal biomarkers.

Clinics

Integrative Medicine Clinic at "G. Bernabeo" Hospital of Ortona (Italy).
The Clinic is aimed to improve the recovery of breast cancer survivors through an integrative approach including nutrition, acupuncture, psychological and physical exercise support after a coordinated multidisciplinary evalutation, completing the standard approach.
https://www.canva.com/design/DAEAFhgTRVY/b3Svod3_7blgyxAL-3eYUQ/view?website#2:l-ambulatorio-di-medicina-integrata

Ophthalmology Clinic (CNAT - National High Technology Center in Ophthalmology) at Clinical hospital "SS. Annunziata" of Chieti.
The Clinic is involved in diagnosis and surgical therapy of retinal and corneal and of glaucoma and cataract.
Diagnosis of 4000 patients/year with different ocular diseases.
Cataract surgery: ~1500 patients/year
Intravitreal Injections: ~ 2000 patients/year
Surgical retina: ~500 patients/year
Glaucoma surgery: ~ 1000 patienst/year

Most significant achievements

Awards of the Integrative Medicine Clinic:

- 12/2016. Award at "**Quality and safety day**" organized by ASL02 of Lanciano-Vasto-Chieti in the area "Improvement of the quality of life".
- 09/2017. Award at "**Innova S@lute 2017**" organized by FPA E TEVA ITALIA to award the best practices of the public administration in the health section.
- 04/2018. Award at "**Andrea Alesini Award**" to award the best practices aimed to promote healty lifestyles and humanize the healthcare system.
- 10/2019. Award at "**Forum PA 2019**" concerning the connected care.
- 06/2022. Award at "**Valore pubblico. La pubblica amministrazione che funziona**" organized by SDA BOCCONI SCHOOL OF MANAGEMENT for the "Allenarsi per la salute into the wild".

Awards of the Ophthalmology Clinic:

- **American Academy Award** for corneal surgery.
- 2013. Retinal surgery aeìward "**Premio Coscas**".
- 2017. **Lans Distinguished Award**. American Academy Ophthalmology, New Orleans, LU, USA.
- 2019. **Innovator Award SOI** Medal Lecture.

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