GIORNATA DELLA RICERCA UCBM

# Research Yearbook 2016

Eugenio Guglielmelli

*Pro-Rector for Research*
*Università Campus Bio-Medico di Roma*

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## Allergology, Immunology, Rheumatology

**Head** A. Afeltra

**Faculty** D.P.E. Margiotta

**Other Personnel** M. Lo Vullo, B. Marigliano, L. Navarini, A. Rigon, G. Sambataro, A. Soriano, M. Vadacca, E.M. Zardi

### Description

The unit's research interests concern epidemiology, pathogenesis, diagnosis and therapy of the systemic autoimmune diseases. The most important research topics are Systemic Lupus Erythematosus and Inflammatory Arthritis. The unit's research methodology is based on the integration of clinical tools, diagnostic imaging (muscoloskeletal ltrasonography and capillaroscopy) and laboratory methods (immunofluorescence, enzyme immunoassay, molecular biology, flow cytometry).

### Main research activities

- Pathogenesis of Lupus nephritis;
- Automation of auto-antibody determination by indirect immunofluorescence;
- Epidemiology and features of inflammatory rheumatic manifestation during therapy with aromatase inhibitors;
- Epidemiology of infection during biologic therapy in a large Italian cohort of rheumatoid arthritis;
- Lipid mediators and Systemic Lupus Erythematosus;
- New bone formation and p40 inhibition;
- Biology, flow cytometry.

### Main collaborations

- Forum Interdisciplinare per la Ricerca sulle Malattie Autoimmuni, (FIRMA);
- Gruppo Italiano di Ricerca in Reumatologia Clinica e Sperimentale (GIRRCS);
- Laboratory of Tissue Homeostasis and Disease (THD), Skeletal Biology and Engineering Research Center (SBE), KU Leuven;
- Rheumatology Day Hospital, Gaetano Pini Institute, Milan;
- The Zabludowicz Center for Autoimmune Diseases, Sheba Medical Center, Israel;
- Unit of Microbiology, San Carlo Borromeo Hospital, Milan;
- Unit of Rheumatology, Spedali Civili Brescia.

### Most important publications

Margiotta D.P., Navarini L., Vadacca M., Lo Vullo M., Pignataro F., Basta F., Afeltra A.

**The IL33/ST2 axis in Sjogren syndrome in relation to disease activity.**
*Eur Rev Med Pharmacol Sci. 2016 Apr;20(7):1295-9. PubMed PMID: 27097949. IF 1,575*

**Objective:** Primary Sjogren's syndrome (pSS) is a systemic autoimmune disorder characterized by infiltration of the exocrine glands leading to secretory insufficiency. Despite the progress made in understanding the pathogenesis of the SS, many aspects remain to be clarified. Interleukin-33 (IL33) is a recently discovered cytokine, belonging to IL-1 superfamily. IL33 and its soluble receptor ST2 were implied in a number of immune and in autoimmune diseases pathogenesis. In this work,we analyzed expression of IL33 and ST2 in Sjogren's syndrome.
**Patients and methods:** Serum IL-33 and soluble ST2 were analyzed using commercial ELISA kit in 15 pSS, 9 patients with Systemic Lupus Erythematosus and 9 controls.
**Results:** We found significant hyperexpression of sST2 in sera of SS patients and SLE patients compared to healthy subjects ($p = 0.04$ and $p = 0.07$, respectively). In pSS, sST2 levels in pSS positively correlated with activity index SSDAI ($r = 0.662$, $p = 0.007$). In SLE, we found positive correlation between ST2 and SLEDAI 2K ($r = 0.685$, $p = 0.04$). Circulating levels of IL-33 were detectable in 2 of 15 SS patients, in 2 SLE patients and in 1 of control subjects.
**Conclusions:** We found a hyperexpression of sST2 in pSS and SLE patients with a possible immune modulatory role, because of a substantial suppression of circulating IL33. In our pSS and SLE cohort, sST2 levels were in correlation with disease activity indices.

Margiotta D., Navarini L., Vadacca M., Basta F., Lo Vullo M., Pignataro F., Zardi E.M., Afeltra A.

**Relationship between leptin and regulatory T cells in systemic lupus erythematosus: preliminary results.**
*Eur Rev Med Pharmacol Sci.2016;20(4):636-41. PubMed PMID: 26957264. IF 1,575*

**Objective:** Crescent literature data demonstrated a role of adipokines in immune responses, particularly leptin is involved in wide spectrum of pro-inflammatory functions. Several evidences suggested that leptin is able to inhibit T regulatory cells proliferation and function in vitro models. In the present study, we investigate the relationship between leptin and circulating T regulatory cells (Tregs) in patients affected by systemic lupus erythematosus (SLE).
**Patients and methods:** 13 SLE patients and 11 healthy controls were enrolled. Metabolic syndrome and cardiovascular parameters were evaluated. Serum leptin levels were detected by commercial ELISA kit and circulating regulatory T cells were determined by FACS analysis as CD4+CD25highFOP3+ lymphocytes.
**Results:** Metabolic syndrome, defined by ATPIII criteria, was more prevalent in SLE compared to controls (38.4% vs. 0%, $p = 0.04$), as well as arterial hypertension (38.4% vs. 0%, $p = 0.04$). We did not find significant differences in mean leptin levels among SLE and controls ($13.13 \pm 1.51$ ng/ml vs. $9.48 \pm 8.67$ ng/ml, $p = 0.6$). Mean Tregs percentage of total CD4 were $1.27 \pm 0.9$ in SLE vs. $2.8 \pm 1.2$ in healthy controls ($p = 0.001$). We found a negative correlation between leptin levels and Tregs percentage of total CD4 in SLE patients ($r = 0.4$, $p = 0.01$).
**Conclusions:** Our results suggest a role of leptin in the regulation of circulating T regulatory cells amount in human SLE.

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- DISSEMINATION AND PROMOTION
- ACCOUNTABILITY
- SELF-ASSESSMENT

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# RESEARCH UNITS 2016 SCIENTIFIC PRODUCTION

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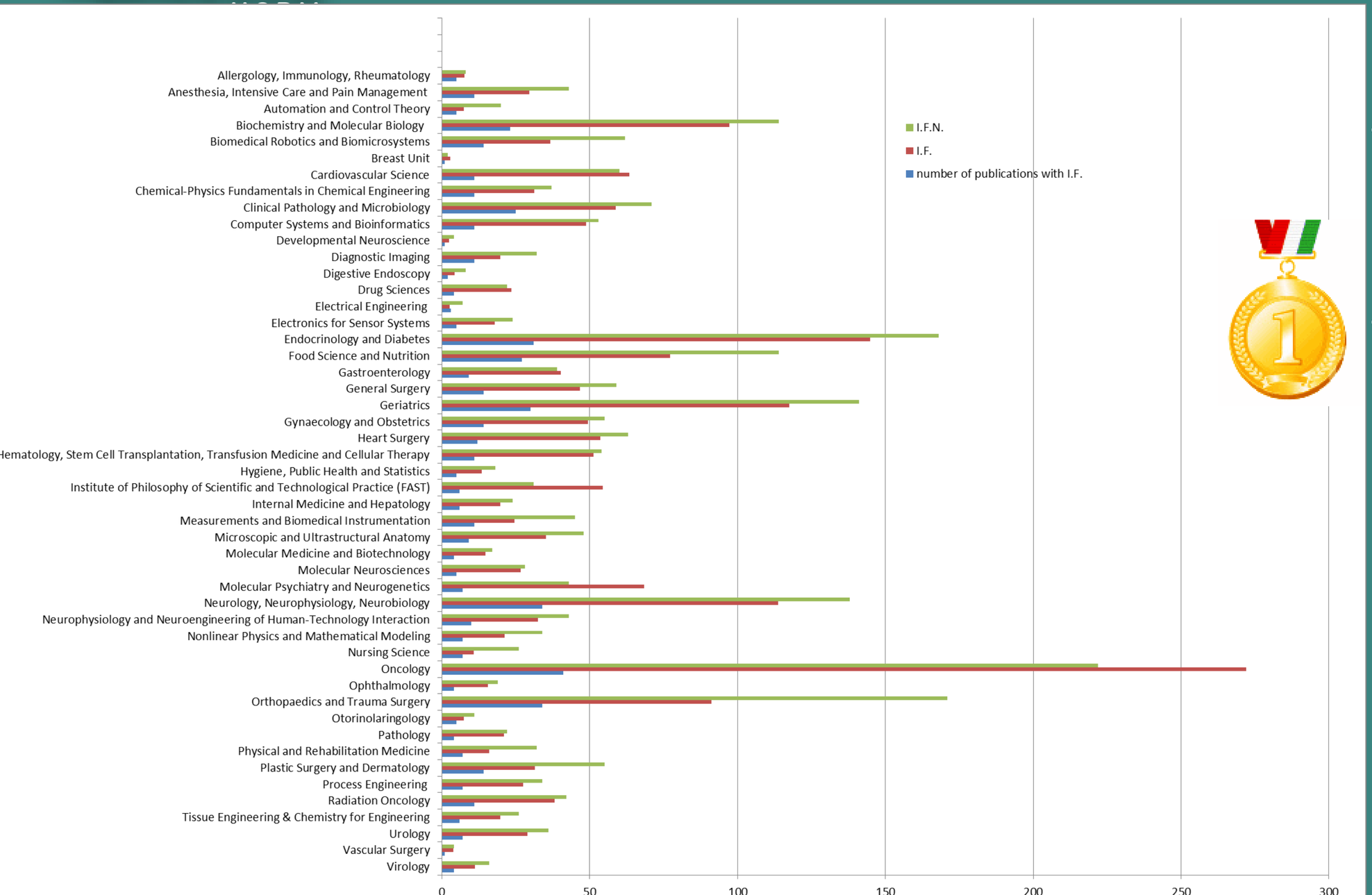





- **Highest number of publications, I.F. N.I.F: Oncology**
- **Highest growth rate wrt 2015:**
  - ✓ **Anesthesia, Intensive Care and Pain Management +267%**
  - ✓ **Chemical-Physics Fundamentals in Chemical Engineering: +175%**

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# 2016 Scientific Production

UNIVERSITÀ CAMPUS BIO-MEDICO DI ROMA

- ✓ ~ 4 publications with I.F. per Faculty member
- ✓ ~ 70% of publications appeared on journals belonging to the first quartile (Q1) of the Scopus/SCImago international periodicals ranking

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# Italian Ministry of Education, University and Research
# Research Projects of National Interest
# 2016 UCBM funded projects

- **Endocannabinoid Signaling in Alzheimer's Disease: A Novel Target for Mechanistic Understanding and Potential Therapeutics**
  **PI: Prof. M. Maccarrone**

- **Pancreatic β-cell identity, glucose sensing and the control of insulin secretion**
  **PI: Prof. P. Pozzilli**

- **Adaptation and tolerance of plants to climate change-dependent abiotic stresses**
  **UCBM Partner: Prof. L. De Gara**

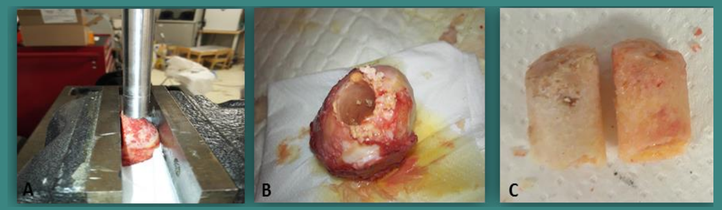
**UCBM success rate: 9,1%** → **Average success rate: 6,8%**

# Strategic UCBM Research Projects
# 2° year main research results

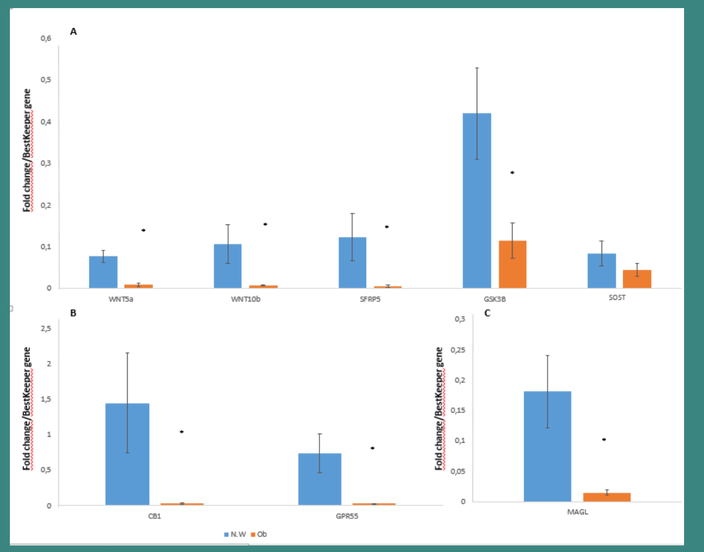
## Evaluation of bone strength and WNT pathway in obese patients

PI: Dr. Nicola Napoli, Research Unit of Endocrinology and Diabetes
Other Research Units involved: Orthopaedic and Trauma Surgery, Pathology, Geriatrics, Radiology, Biochemistry, Measurements and Biomedical Instrumentation.

- ✓ Bone samples have been processed to carry out biomechanical tests




- ✓ Gene expression analysis in bone adipose tissue and skeletal muscle showed that WNT pathway is differently modulated.




*Gene expression analysis of WNT pathway (A) and ECS elements (B and C) in bone, in normal weight (N.W) and obese subjects (Ob).*

# Strategic UCBM Research Projects
# 2° year main research results

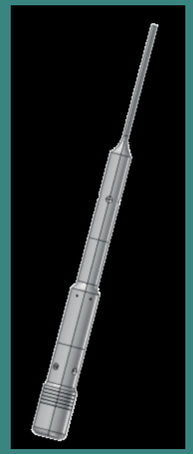
## Smart surgical platform for the transpedicular delivery of advanced regenerative therapies into the intervertebral disc space

PI: Prof. Rocco Papalia, Research Unit of Orthopaedic and Trauma Surgery
Other Research Units involved: *Biomedical Robotics and Biomicrosystems, Neurology, Neurophysiology, Neurobiology*

Submodules of the START-Disc surgical platform have been developed:

- a mechanical support (MS) with 5 Dof for positioning and orienting the surgical tools, able to be interfaced with common surgical tables;
- An ultrasonic driller for deep hole into the vertebras preserving the soft tissues;

*intraoperative set-up*



*ultrasonic driller*

- a rotary drill to characterize the mechanical impedance of bone tissues and to implement a first monitoring system of the manual advancement of the drill
- a pressure sensor for intraoperative measuring the IVD pressure during the ATMPs delivery

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# Strategic University Projects
# 2° year main research results

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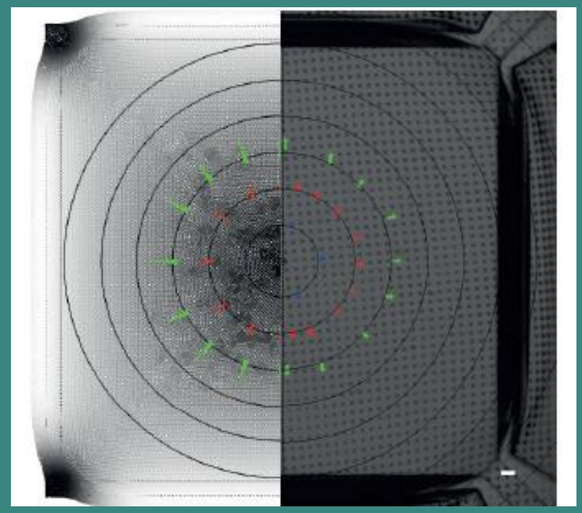
## A multi-cellular ‘gut-on-chip’ technology for predictive human safety testing: an integrated experimental and modeling approach

PI: Dr. Alberto Rainer, Research Unit of Tissue Engineering and Chemistry for Engineering
Other Research Units involved: Gastroentrerology, Nonlinear Phisycs and Mathematical Modeling, Microscopic and Ultrastructural Anatomy

✓ Microfluidic platform with multiaxial stretching capability:
- computationally informed design of the chip optimized geometry
- device microfabrication via soft-lithographic techniques
- experimental validation of the device prototypes



*Comparison between the in silico modeled (on the left) and the experimentally obtained (on the right) multiaxial stretching of the chip.*

✓ Successful set up different in vitro and ex vivo models of the intestine barrier based on cell lines, intestine mucosa biopsies, and colonic explants, to be used as a benchmark for the biological validation of the on-chip intestine barrier model.

# 2016 UCBM patents application

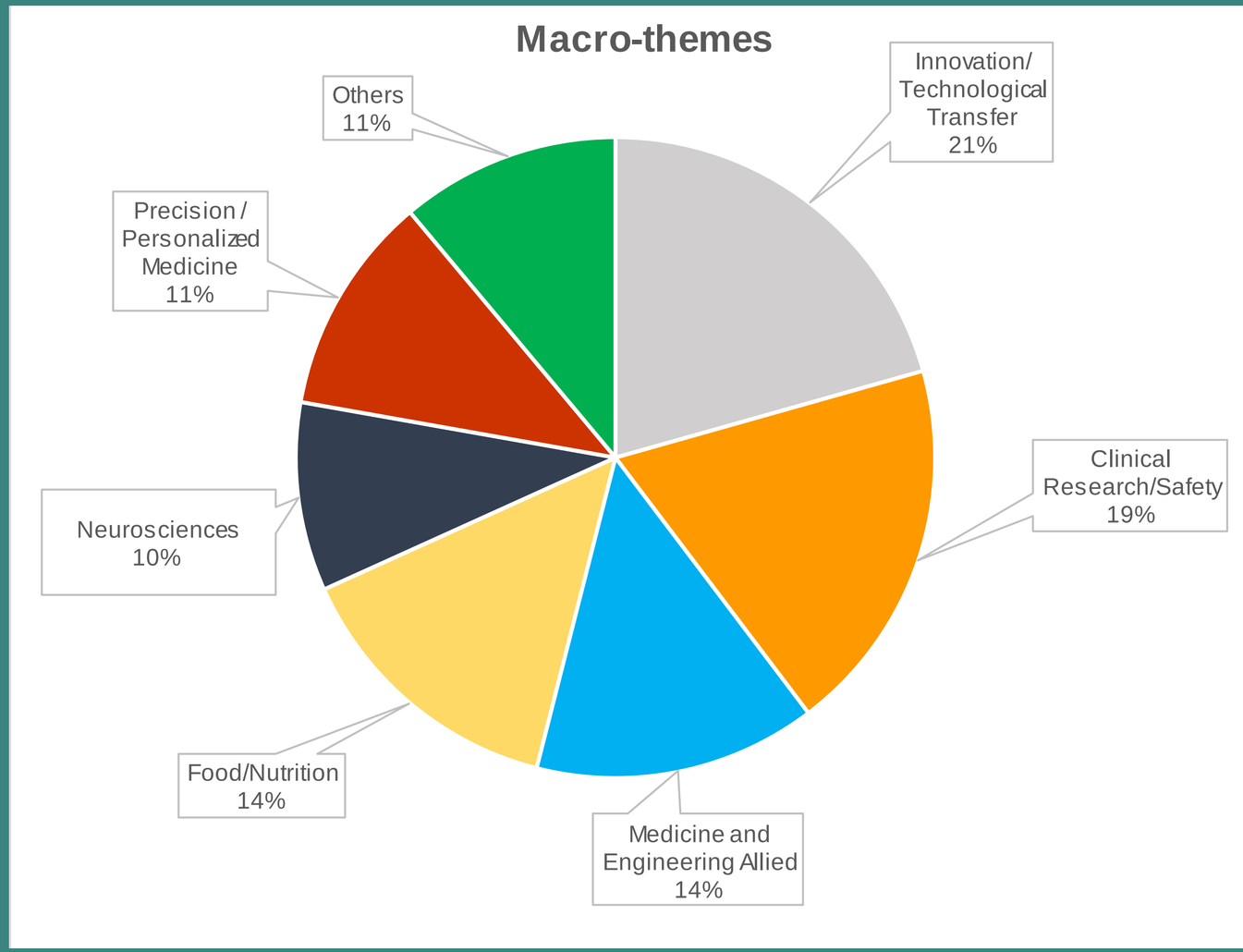
- ✓ **Method for measuring slippage between surfaces (IT102016000105302)**
  **Co-owner: INAIL**

- ✓ **Method for positioning the units of an array of tactile sensors for obtaining a hyper spatial acuity and processing method thereof (IT102016000076248)**
  **Co-owners: Scuola Superiore Sant'Anna di Pisa, Istituto Italiano di Tecnologia**

- ✓ **Porous material for cytoinclusion, process for the obtaining thereof and its use (IT102016000111352);**
  **Co-owner: UCS Diagnostic srl**

# «La Giornata della Ricerca che vorrei: …»
# («The Research Day that I would like to have: …»)

- ✓ The survey has been launched last February 17th.
- ✓ 63 responses



# 2016 Research Week

# Innovation and Technology: the new frontiers for human health

**Figures:**

- ✓ 36 speakers:
  - 24 guest speakers (8 foreigners speakers)
  - 14 medical doctors, 10 engineers (7 bioengineers), 9 biologists, 1 economist, 1 expert in human resources, 1 expert in EU-projects
- ✓ 2 workshops
  - Innovation in biomedicine: advanced in vitro and in silico models
  - Guidelines for clinical trials: new EU regulations and UCBM model
- ✓ UCBM Research Day
- ✓ Training common platform PhD Course «Integrated Biomedical Sciences and Bioethics» and PhD Course «Bioegnineering and Biosciences» (30+ hours of lessons)

SETTIMANA DELLA RICERCA UCBM | 15 - 19 maggio

INNOVAZIONE E TECNOLOGIA: LE NUOVE FRONTIERE PER LA SALUTE DELL'UOMO

**Lunedì 15 maggio**

Sala Conferenze PRABB
- 09:00–10:00 Saluti istituzionali
- 10:00–10:15 Presentazione della Scuola di Dottorato 2017
- 10:15–10:45 La rilevanza del periodo all'estero nel percorso di dottorato — P. Pozzilli

Coffee break

Aula R2
- 11:00–12:00 Il dottorato di ricerca: un percorso formativo complementare per le professioni del futuro — I. Screpanti
- 12:00–13:00 La terapia dialitica: principi tecnologici, approccio clinico e qualità della vita del paziente — M. L. Costantino

Welcome Lunch

Sala Conferenze PRABB
- 14:30–15:30 L'identità, la missione e il progetto culturale dell'Università Campus Bio-Medico di Roma — L. Anfossi
- 15:30–17:00 Designing a clinical research study — A. Schwartz

Aula R6
- 15:30–17:00 Pure hydrogen production in a membrane reformer: demonstration, macro-scale and atomic scale modeling — M. Sheintuch

Sala Conferenze PRABB
- 17:00–18:30 Il futuro della ricerca in ingegneria biomedica — M. C. Carrozza

**Martedì 16 maggio**

Aula Magna Trapezio 2
- 09:00–11:00 Workshop "Innovation in biomedicine: advanced in vitro and in silico models"

Coffee break

Aula Magna Trapezio 2
- 11:30–13:30 Workshop "Innovation in biomedicine: advanced in vitro and in silico models"

Sala Conferenze PRABB
- 13:15–14:15 Discussione sull'esercizio della VQR 2011–2014

Aula Magna Trapezio 2
- 15:00–16:30 L'importanza di rafforzare le competenze dei ricercatori in materia di valorizzazione dei risultati della ricerca — A. Piccaluga

Aula T8
- 16:30–18:00 La chirurgia robotica e le tecnologie ad essa correlate: sfide aperte e progetti in corso — A. Menciassi

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Via Álvaro del Portillo, 21 - 00128 Roma
R.S.V.P eventi@unicampus.it

**Mercoledì 17 maggio**

Aula Magna Trapezio
- 08:30–13:30 Giornata della Ricerca

Buffet nel foyer dell'Aula Magna

Aula Magna Trapezio
- 14:45–15:30 How to survive a peer review process — G. A. FitzGerald, G. Yang
- 15:30–16:45 Molecole bioattive delle piante: dalla ricerca di base al trasferimento tecnologico — M. E. Maffei
- 16:45–17:30 Presentazione migliori tesi di dottorato

**Giovedì 18 maggio**

Aula Magna Trapezio 2
- 09:00–11:00 Linee guida e requisiti di fattibilità delle sperimentazioni cliniche — G. Gussoni

Coffee break

Aula Magna Trapezio 2
- 11:30–13:00 Workshop "Linee guida per le sperimentazioni cliniche nella prospettiva del nuovo regolamento europeo e il modello organizzativo UCBM"
- 14:00–16:30 Dall'idea al progetto di ricerca: tipologie di finanziamenti e struttura della proposta — C. Buonocore, A. Benvenuto, M. Fioretto
- 16:30–17:30 Bone Health e metastasi ossee: un continuum of care — D. Santini

**Venerdì 19 maggio**

Aula Magna Trapezio 1
- 09:00–10:00 Sistema motorio corticale — G. Rizzolatti
- 10:00–11:00 I neuroni specchio — G. Rizzolatti

Coffee break

Aula Magna Trapezio 1
- 11:30–12:30 Cell-based social networks: shaping and maintaining bone architecture — R. Civitelli
- 12:30–13:30 Sistemi multisensoriali per la salute degli anziani — R. Antonelli Incalzi
- 13:30–14:00 Conclusioni

Sala Conferenze PRABB
- 15:00–18:00 Sessione aperta della riunione del Comitato Scientifico dell'Istituto FAST – Istituto di Filosofia dell'Agire Scientifico e Tecnologico dell'Università Campus Bio-Medico di Roma
  - 15:00 Presentazione del FAST — E. Covino
  - 15:15 Presentazione dei temi di ricerca Ricercatori FAST – parte I
  - 16:15 Coffee break
  - 16:30 Presentazione dei temi di ricerca Ricercatori FAST – parte II
  - 17:30 Discussione con i componenti del Comitato Scientifico
  - 18:00 Fine dei lavori

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# CONCLUSIONS


- RESEARCH IS A KEY DRIVING FACTOR
- 2017-2019 STRATEGIC RESEARCH PLAN
- REWARD OF BEST PRACTICES
- THIRD MISSION: TECHNOLOGY TRANSFER & CLINICAL INNOVATION
- READY TO SURFING NEW WAVES…..

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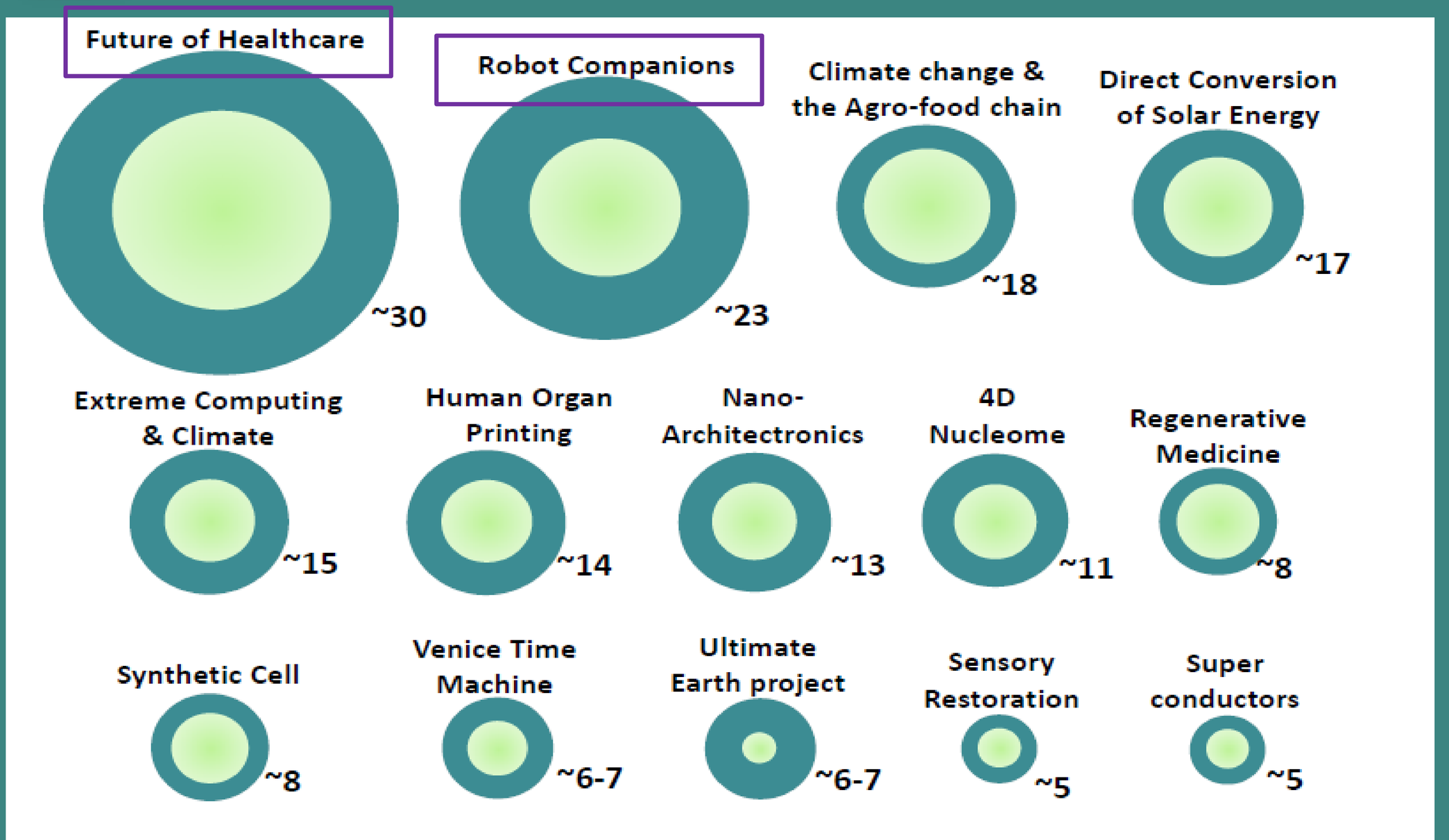
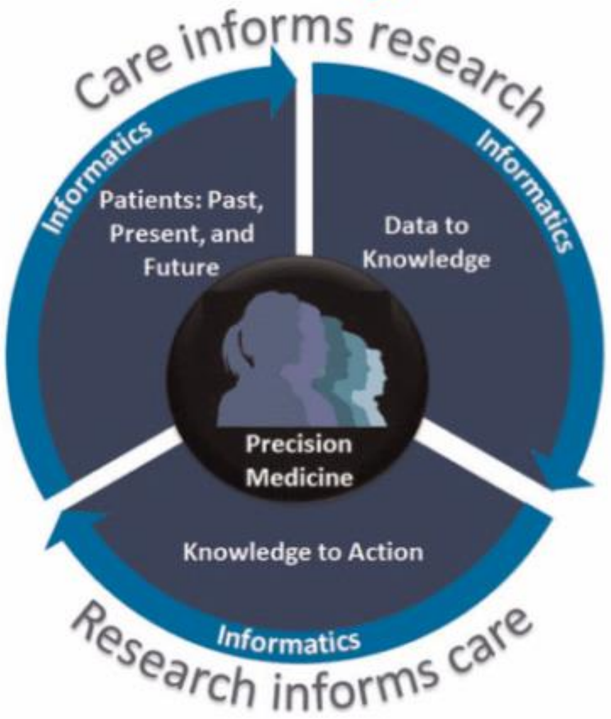
# FUTURE EU FET - FLAGSHIPS THEMES



# Data integration: the cornerstone of future digital medicine





An informatics research agenda to support precision medicine: seven key areas

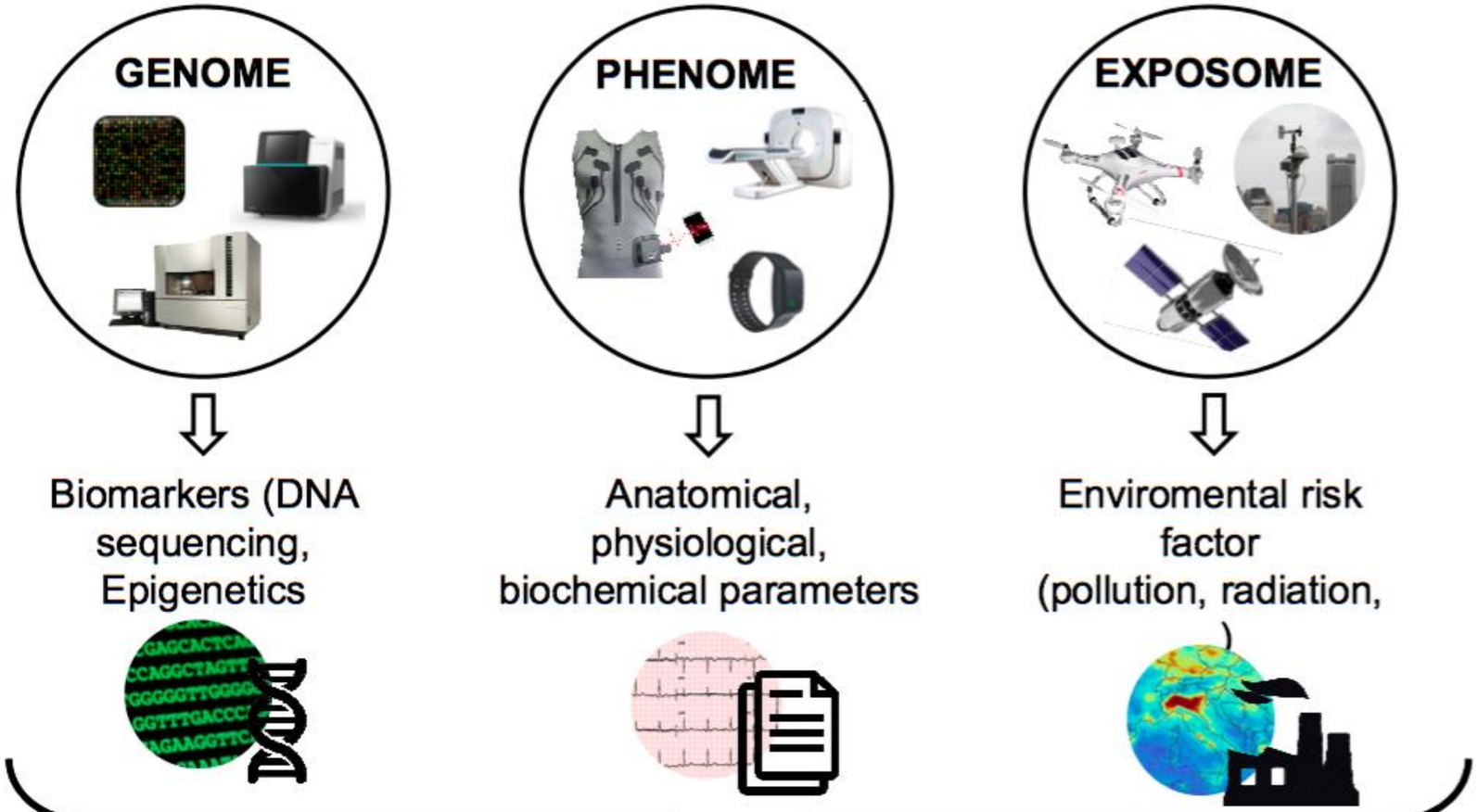
Jessica D Tenenbaum, Paul Avillach, Marge Benham-Hutchins, Matthew K Breitenstein, Erin L Crowgey, Mark A Hoffman, Xia Jiang, Subha Madhavan, John E Mattison, Radhakrishnan Nagarajan, Bisakha Ray, Dmitriy Shin, Shyam Visweswaran, Zhongming Zhao, Robert R Freimuth

DOI: http://dx.doi.org/10.1093/jamia/ocv213 ocv213 First published online: 23 April 2016



*La medicina del futuro, R. Bellazzi, Atti Scuola GNB, 2016*

# Biomedical Big Data




CHT Centre for Health Technologies University of Pavia

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*La medicina del futuro, R. Bellazzi, Atti Scuola GNB, 2016*

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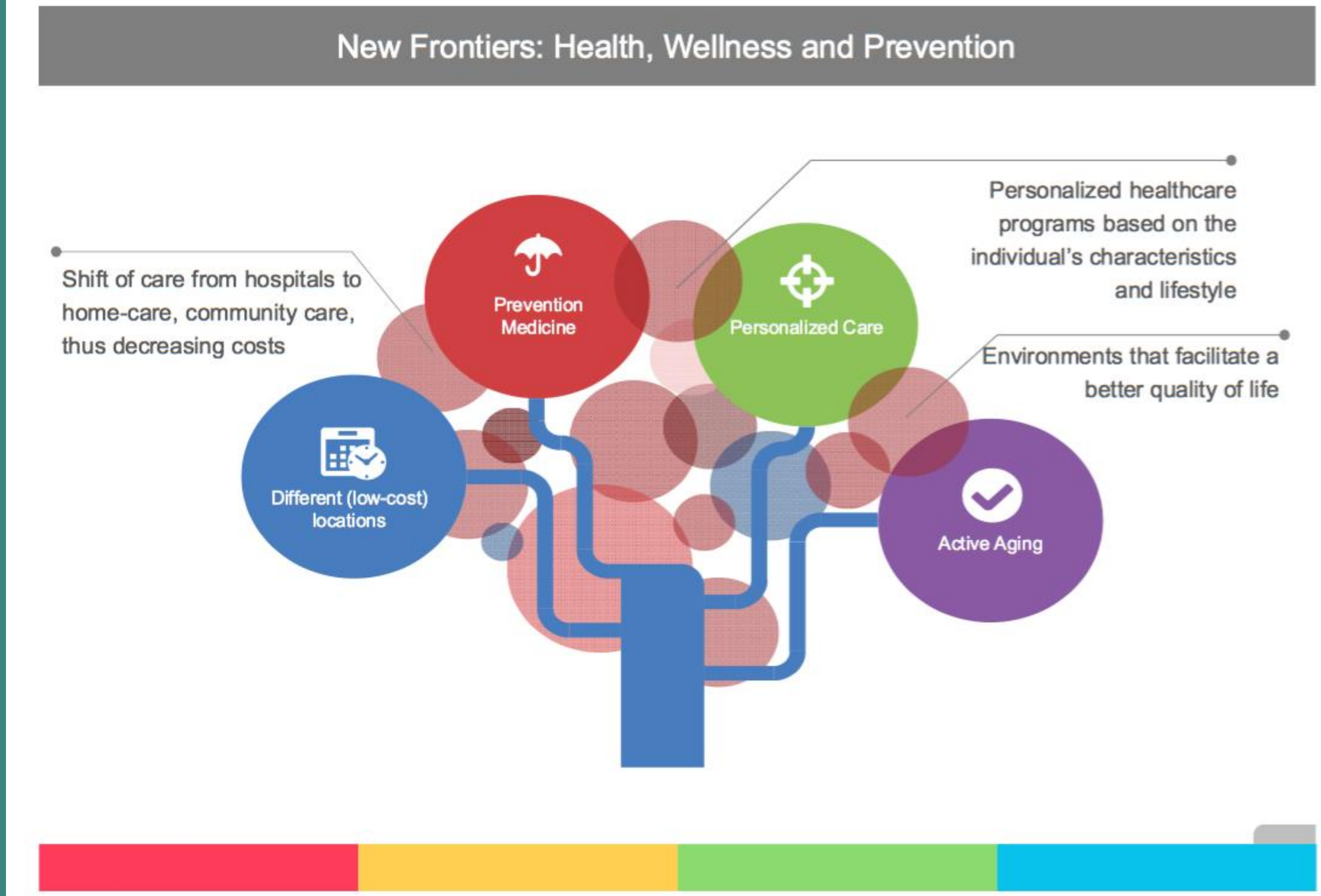


*La medicina del futuro,*
*S. Pecorelli,*
*Atti Scuola GNB, 2016*

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# HEALTHY LIVING AND ACTIVE AGING

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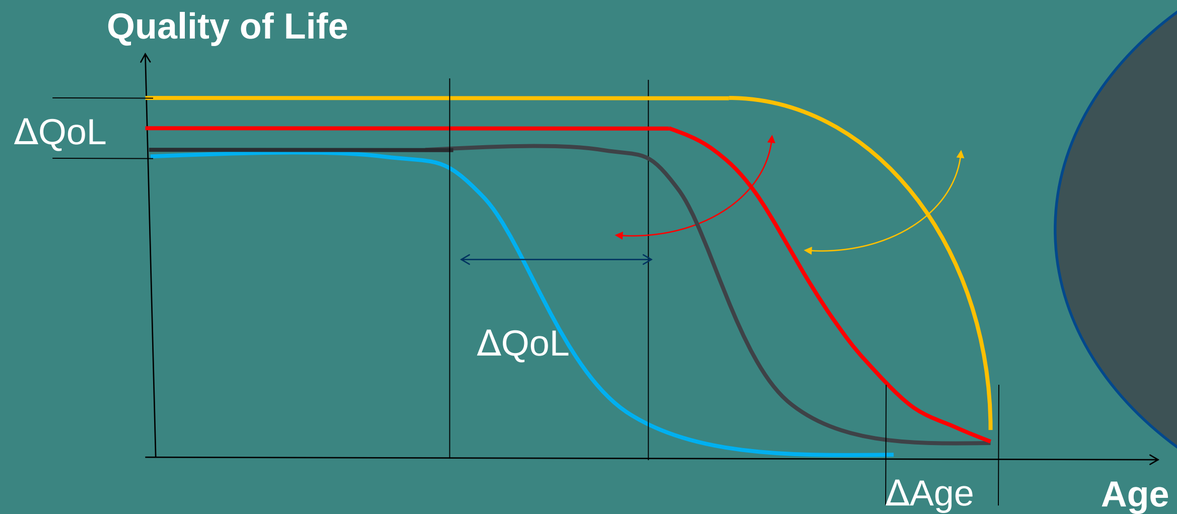


Without AAL devices and services

Effects of AAL4prevention

Effects of AAL4support and compensation

Effects of AAL4indipendent and active ageing

**PREVENTION**
*Tasks supporting and maintaining cognitive and motor abilities before severe diseases (i.e. health periodic monitoring, fall preventions, etc.)*

**COMPENSATION & SUPPORT**
*Tasks supporting cognitive and motor abilities after severe diseases (i.e. smart walker, pedestrian GPS, etc.)*

**INDEPENDENT & ACTIVE AGEING**
**Tasks supporting independence of elderly (i.e. social inclusion, work, leisure and entertainment, etc.)**

*AALiance Roadmap 2014*

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# LA BIOINGEGNERIA PER IL BENESSERE E L'INVECCHIAMENTO ATTIVO

INAIL

2017

Roma, 12 aprile 2017
Inail Auditorium
Piazzale Giulio Pastore, 6
ore 10.00 - 12.30

I CONVEGNI

RIVISTA
DEGLI INFORTUNI e DELLE
MALATTIE PROFESSIONALI

**La Rivista**
**degli infortuni e delle malattie professionali**

presenta

**"La bioingegneria per il benessere e l'invecchiamento attivo"**

a cura di

Maria Chiara Carrozza - Eugenio Guglielmelli - Riccardo Pietrabissa

*9.30 registrazione*

Intervengono:

- *Massimo De Felice,* Presidente Inail
- *Luigi La Peccerella,* Direttore della Rivista infortuni e malattie professionali Inail
- *Maria Chiara Carrozza,* professore ordinario di Bioingegneria industriale, Scuola Superiore Sant'Anna di Pisa
- *Eugenio Guglielmelli,* prorettore alla ricerca, Università Campus Bio-Medico di Roma
- *Riccardo Pietrabissa,* professore ordinario di Bioingegneria, Politecnico di Milano
- *Angela Goggiamani,* Sovrintendente sanitario centrale Inail
- *Walter Ricciardi,* Presidente ISS
- *Giuseppe Lucibello,* Direttore generale Inail
- ***Beatrice Lorenzin,* Ministro della Salute**

*12.30 Conclusione dei lavori*

*R.S.V.P.*

Direzione centrale
pianificazione e comunicazione
*Segreteria organizzativa 0654875607-2395*

**Campagna 2016-2017: Ambienti di lavoro sani e sicuri ad ogni età**

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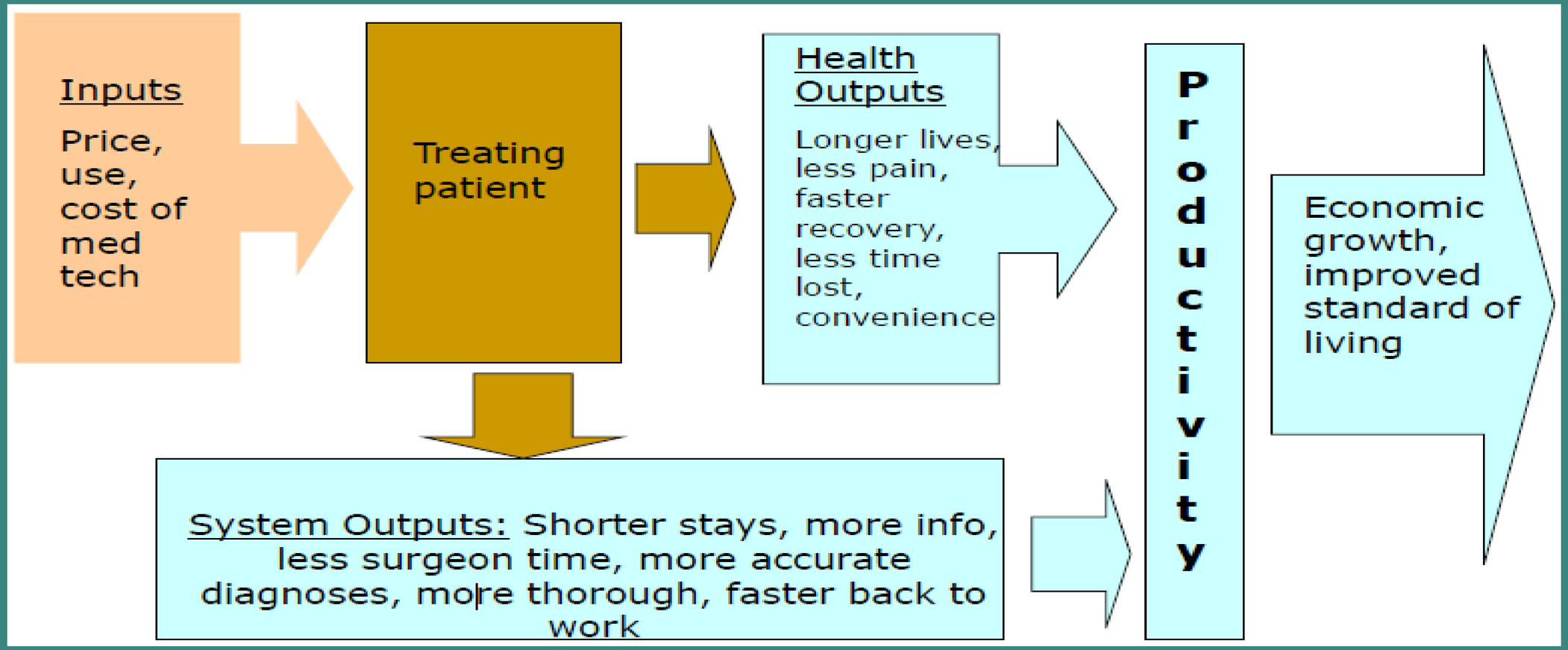
# New Paradigm for Healthcare Sustainability

*Focus switches from inputs/costs to outputs/value*



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# CONVERGENCE OF SOCIAL SCIENCES AND HUMANITIES WITH SCIENCE AND ENGINEERING

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La Scienza per l'Uomo

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### Academic Research Board

Andrea Onetti Muda - *Chancellor*

Paolo Sormani - *General Manager of the University*

Eugenio Guglielmelli - *Pro-Rector for Research*

Gianfilippo Capriotti - *Head of Research Administrative Area*

### Academic Research Scientific Committee

Eugenio Guglielmelli - *Pro-Rector for Research*

Marcella Trombetta - *Research Coordinator of the Department of Engineering*

Giorgio Minotti - *Past Research Coordinator of the Department of Medicine and Surgery (until October 31, 2016)*

Vincenzo Di Lazzaro - *Research Coordinator of the Department of Medicine and Surgery (from November 1, 2016)*

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