

Prof. Ennio Tasciotti

Curriculum Vitae

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GENERAL INFORMATION

Born in Latina, Italy – 20 August 1977

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Institution email: ennio.tasciotti@sanraffaele.it

WEBSITES

ORCID: <https://orcid.org/0000-0003-1187-3205>

SCOPUS: <https://www.scopus.com/authid/detail.uri?authorId=23971656200>

Google Scholar: <https://scholar.google.com/citations?user=A8sSvg0AAAAJ&hl=en>

San Raffaele: <https://sanraffaele.it/personale/ennio-tasciotti/>

EDUCATIONAL BACKGROUND

2000 - M.S. Biological Sciences, summa cum laudae, University of Pisa, Italy

2001 - M.S. Biology, summa cum laudae, Scuola Normale Superiore degli Studi di Pisa

2005 - Ph.D. Molecular Biology, summa cum laudae, Scuola Normale Superiore degli Studi di Pisa and International Center for Genetic Engineering and Biotechnology (ICGEB)

SCIENTIFIC CAREER AND POSITIONS

2021- Director Human Longevity Program, IRCCS San Raffaele, Rome.

2019-2020 Vice Chair, Department of Orthopedics and Sports Medicine, Houston Methodist Hospital, Houston, TX.

2017-2020 Founder and Director, Center for Musculoskeletal Regeneration, Department of Orthopedic and Sports Medicine, Houston Methodist Hospital, Houston, TX.

2016 - 2020 Founder and Director, Center for Biomimetic Medicine, Regenerative Medicine Program, Houston Methodist Research Institute, Houston, TX.

2011-2016 - Associate Professor Nanomedicine, Methodist Research Institute, Houston, TX.

2009-2011 Assistant Professor Nanomedicine, University of Texas Health Science Center at Houston (UTHSC-H), Institute for Molecular Medicine, Houston, TX.

2006-2009 Senior Postdoctoral Fellow, Nanomedicine Laboratory, Institute of Molecular Medicine, University of Texas Health Science Center, Houston, TX.

2005 - Visiting Scientist, Micro Medical Device Laboratory, Ohio State University, Columbus, OH

2005 - Postdoctoral Fellowship in Molecular Imaging, Center for Biomolecular Medicine, AREA Science Park, Trieste, Italy.

2005-2006 Postdoctoral Fellow, Molecular Medicine Laboratory, ICGEB Trieste, Italy.

ACADEMIC AFFILIATIONS

2023- to date Full Professor Applied Medical Sciences and Technologies, San Raffaele University.
2021- 2022 Contract Professor (Professore Straordinario), San Raffaele University, Rome.
2018-2020 Full Professor of Regenerative Medicine, Houston Methodist Hospital, Houston, TX.
2014-2018 - Associate Professor of Orthopedic Surgery, Houston Methodist Hospital, Department of Orthopedics and Sports Medicine, Houston, TX.
2010-2015 Chairman, Department of Nanomedicine, Houston Methodist Research Institute, TX.
2010-2016 Adjunct Professor of Nanomedicine, Graduate School of Biomedical Sciences (GSBS), University of Texas Health Science Center, Houston, TX.
2011-2016 Associate Professor of Nanomedicine, Institute for Academic Medicine, Houston, TX
2013-2016 Visiting Professor of Material Sciences, Chinese Academy of Sciences, Beijing.
2014-2020 Adjunct Professor of Bioceramics and Bio-hybrid Composites, Italian National Research Council, Institute of Science and Technology for Ceramics Faenza, Italy.
2015-2020 Honorary Professor, Department of Molecular Medicine and Medical Biotechnology, Center for Advanced Biotechnology, University of Federico II of Naples, Italy.
2015-2020 Honorary Professorship. Swansea University School of Medicine, UK.
2016-2020 Adjunct Professor, Texas A&M University, Dpt Molecular Cellular Medicine.
2016-2020 Adjunct Professor, Texas A&M University, Dpt of Biomedical Engineering.
2019-2020 Affiliated Member, Graduate Committee Faculty, Texas A&M University

CORPORATE CONSULTING AND ENTREPRENEURSHIP

2023- Scientific Advisor, Cube Labs Venture Builder, Milan, Italy.
2022- Scientific Advisor, Cluster Lifesciences, Friuli Venezia Giulia, Italy.
2022- Founder and CSO Integra R&D srl, Rome, Italy.
2021- Founder and CSO Aella Labs Sagl, Lugano, Switzerland.
2021- Corporate Consultant for Roche Pharma, Named, Gilead, Corden Pharma, Sclavo Diagnostics, Novartis, AlfaSigma, Protiviti, Aboca, Inpeco, Ferrero, CORIS.
2021- Board Member Lightscience srl, Milan, Italy.
2020-2023 Consultant and Due Diligence Advisor for institutional funds (Panakes, principia, AuroraTT, Utopia, Sofinnova, Cascade Global-UK)
2020-2022 Founder and Director Sclavo Research Center, Siena, Italy.
2020- Scientific Advisor G-Factor, ComoNext, CubeLabs, Technoscience, THD, EOS Consulting.
2020-2023 Board Member Friuli Innovazione srl, Udine, Italy.
2020-2022 Founder and CSO 3R Biotech srl, Milan, Italy.

ADMINISTRATIVE RESPONSIBILITIES

2010-2019 Member HMRI Hazardous Substances Committee
2010-2019 Member HMRI Institutional Biosafety Committee
2010-2016 Scientific Director HMRI Surgical Advanced Technology Laboratory
2011-2015 Member HMRI Scientific Council Meeting
2011-2015 Member HMRI Clinical Council Meeting

2011-2015 Member HMRI Council of Chairs
2013-2019 Member IAM Faculty Affairs Committee
2015-2019 Director HMRI Center for Biomimetic Medicine
2017-2019 Director Center for Musculoskeletal Regeneration
2019 Director of Research for Center of Excellence in Orthopedics and Sports Medicine
2023 Director of Research for Human Longevity Program
2024 President Scientific Board Plastic Free ONLUS

HONORS AND AWARDS

2000-2005 Italian Ministry of Education “Distinguished Scholar Fellowship”
2000 Molecular Biology Research Society Graduate Student Award
2001-2005 European Community “Researchers Training and Mobility Program” Fellowships
2004 Best Abstract & Travel Award, American Society for Gene Therapy, Minneapolis, USA
2006 Best Abstract & Travel Award, Society of Molecular Imaging Meeting, Minneapolis, USA
2006-2007 University of Texas Undergraduate Society Research Fellowship
2008 Best Abstract and Travel Award, World Conference on Molecular Imaging, Nice, France
2009 Nature Medicine , "Five big ideas for nanotechnology"
2011 Best Italian Cancer Research Scientists Award, ISSNAF, Washington DC
2012 TMHRI President’s Award for Transformational Excellence
2012 Moran Foundation Award in Translational Research
2013 Italy-America Chamber of Commerce “PrimiDieci Under Forty Award”
2015 TMHRI President’s Award for Transformational Excellence
2016 Career Award, NanoScience Symposium, Houston
2017 Houston Men of Distinction Award
2018 Houston Men of Distinction Award
2020 Winner American Chemical Society Nano Championship
2022 Taobuk Award for Nanoscience and Nanomedicine
2023 Stanford University Scientific Ranking (Top1% of most influential scientists worldwide)
2024 Inducted as Fellow of the International Association for Advanced Materials (IAAM) in recognition of the outstanding contributions to the field of advanced materials and technology

SCIENTIFIC LEADERSHIP ROLES

Organizer and Conference Chair – Innovation in Lifesciences, Trieste. (November 2023)
Organizer and Conference Chair – Next Oncology, Italy. (October 2023)
Strategic Advisor - Technoscience Park Rome, Italy. (2019-2022)
Scientific Advisor TMCx - Texas Medical Center Incubator/Accelerator, TX. (2015-2019)
Extramural Funding Advisory Committee - Texas A&M Health Science Center, TX. (2018-2019)
Junior Cabinet Member - President Leadership Council Advisory Board. (2015-2018)
Organizer and Session Chair - Conference of the Italian Researchers in the World. (2012- 2018)
President - Italian Ministry of Health Grant Review Panel. (2012-2015)
Scientific Leadership Committee - Young Against Pain, Italy. (November 2014-2020)
Organizer and Conference Chair -Materials in Medicine, Italy. (October 2013)

Director - Accademia delle Nanoscienze, Italy. (2011-2016)

DIDACTIC ACTIVITY:

Full Professor in Applied Medical Sciences and Technologies at San Raffaele University, Roma (01-06-2023 – current)

The course is offered within the department of human sciences and promotion of quality of life. The course covers the main innovations in preventive and diagnostic medicine as well as the most innovative technologies for wellbeing, healthy longevity and rehabilitative medicine.

Contract Professor in Nutraceutical Sciences and Human Nutrition at San Raffaele University, Roma (01-05-2022 – 30-05-2023)

The course covers the formulation of nutraceutical molecules in nano and micro particles for the improvement of the physicochemical properties of the individual molecules and the creation of innovative nutraceutical therapies.

Member of the PhD Graduate Program in Medical and Surgical Biotechnologies and translational medicine, Tor Vergata University, Rome (from 10-11-2022 – current)

Prof. Tasciotti is affiliated to the Graduate program in Medical and Surgical Biotechnologies and translational medicine to hold lectures on the principles of development of nano- and micro-technologies for drug delivery and tissue engineering applications.

Member of the PhD Graduate Program of the Department of Biomedical Engineering, University of Houston, Houston Texas, USA (from 01-01-2008 to 31-12-2014).

During his tenure at the University of Houston PhD School of Biomedical Engineering, Prof. Tasciotti taught classes at the doctoral course in Biomedical Engineering through a series of lectures and seminars on nanotechnology, microformulations and biomaterials for drug delivery and tissue engineering to PhD students. Prof. Tasciotti was also the lead and primary mentor of the PhD candidate Iman Yazdi. His PhD award in 2015 was achieved following exposure of his research work on the development of nanostructured materials for drug delivery and tissue engineering applications. The student was co-mentored by Prof. Metin Akay (Chairman, Department of Biomedical Engineering, University of Houston).

Member of the Graduate School of Biomedical Sciences, University of Texas Health Science Center, Houston Texas. (01-01-2010 to 31-12-2016)

During his appointment to the PhD School of Biomedical Sciences at the University of Texas Health Science Center at Houston, Prof. Tasciotti taught classes for the PhD in Biomedical Sciences through a series of lectures and seminars on nanomedicine approaches and on the basic principles of translational research (patenting, tech transfer, licensing). Prof Tasciotti was also the primary mentor of the PhD candidate Johnathan Martinez. The student was co-mentored by Mauro Ferrari (Houston Methodist Hospital) and Misha Kolonin (University of Texas).

Member of the PhD Graduate Program of the Department of Material Sciences, Chinese Academy of Sciences, Beijing, China. (01-01-2013 to 31-12-2017)

During his appointment at the PhD School of Materials Science in Beijing, Prof. Tasciotti taught classes for the PhD in Materials Science through a series of lectures and seminars on nano-micro- and bio-materials for drug delivery and tissue engineering applications. Prof. Tasciotti was primary mentor of the PhD candidate Laura Pandolfi. The student was co-mentored by Prof. Gong Zhubou (Chinese Academy of Sciences).

PhD advisor for the students of the Graduate Program of the Department of Biomedical Engineering, Rice University, Houston Texas, USA. (01-01-2014 to 31-10-2020)

Prof. Tasciotti taught a series of lectures and seminars on biomimetic medicine approaches for the development of technology platforms for controlled drug release and for the support of cell growth. Prof. Tasciotti was the primary mentor of the PhD candidates Chris Tsao and Manuela Sushnita. The students were co-mentored by Prof. Jeff Jacot (for Dr. Tsao) and Prof. Omid Veisheh (for Dr. Sushnita) both from Rice University, Houston.

PhD advisor for the students of the Graduate Program of the School of Medicine and Health Sciences, Tecnológico de Monterrey, Monterrey, Mexico. (01-01-2016 to 29-10-2020)

Prof. Tasciotti was the primary mentor of the doctoral candidate Christian Boada. The achievement of his doctorate in 2020 followed the exposure of his research on the development of a biomimetic formulation of liposomes functionalized with the protein complexes LDL and HDL in order to increase their tropism for tissues actively accumulating cholesterol.

International Lecturer of "Biomimetic Theranostics" at the International Graduate School in Nanostructured Materials in Biomedical Applications. Turku, Finland. (20-09-2013 to 28-09-2013)

Prof. Tasciotti participated in the summer school of the PhD course in Nanostructured Materials for biomedical applications with a cycle of lessons on the use of nanoparticles with dual functionality for both the therapeutic and diagnostic part. The lectures contained both basic principles for the formulation of injectable nanoparticles with imaging modalities (contrast agents) and therapy (bioactive molecule release), as well as general criteria for approval by regulatory agencies for use of biomimetic theranostics in clinical practice.

Lecturer of "Nanomaterials for tissue engineering and drug delivery", at the ENMED (engineering and medicine) graduate program, Texas A&M, College Station, TX. (15-06-2017 to 18-07-2018)

Prof. Tasciotti was affiliated to the ENMED doctoral program of Texas A&M and held lectures on the principles of design and on the methods of synthesis and characterization of nanomedicine platforms for the ferried drug treatment. In line with the objectives of the course (engineering and medical training), both issues of optimization of manufacturing processes (engineering) and approaches for their validation in the preclinical field (medical application) were covered.

MENTORING

Prof. Tasciotti mentored 20 PhD students (01-01-2008 to 31-12-2021)

2008– 2011 Nicoletta Quattrochi, PhD in Biotechnology, Univ. of Milano Bicocca, Italy
2008– 2012 Ciro Chiappini, PhD in Biomedical Engineering, University of Texas, Austin, TX
2009– 2012 Rachel Buchanan, PhD in Biomedical Engineering, University of Texas, Austin, TX
2010– 2013 Christine Smid, PhD in Biomedical Engineering, University of Texas, Austin, TX
2010– 2012 Mariavittoria Enzo, PhD in Molecular Biology, Univ. of Padova, Italy
2010– 2012 Nelly Song, PhD in Nanomedicine, University Texas Medical Branch, Houston, TX
2010– 2012 Nikhil Bhargava, PhD in Nanomedicine, Univ. of Texas Medical Branch, Houston, TX
2011– 2012 Chiara Bedin, PhD in Molecular Biology, Univ. of Padova, Italy
2010–2013 Brandon Brown, PhD in Nanomedicine, Univ. of Texas Medical Branch, Houston, TX
2011–2016 Jonathan Martinez, PhD in Biomedical Engineering, University of Texas, Austin, TX
2011–2014 Silvia Minardi, PhD in Chemical Sciences, University of Bologna, Italy
2010–2015 Iman Yazdi, PhD in Biomedical Engineering, University of Houston, Houston, TX
2013-2016 Laura Pandolfi, PhD in Biomedical Engineering, Chinese Academy of Sciences, Beijing.
2015-2016 Simo Nakki, PhD in Applied Physics, University of Eastern Finland, Turku, Finland
2015-2020 Guillermo Bauza, PhD in Regenerative Medicine, Swansea University, UK
2015-2017 Noemi Arrighetti, PhD in Molecular Pharmacology, University of Milan, Italy
2016-2019 Chris Tsao, PhD in Biomedical Engineering, Rice University, Houston, TX
2016-2020 Christian Boada, MD/PhD Biomedical Engineering, Monterrey TEC, Mexico
2017-2020 Manuela Sunshita, PhD Biomedical Engineering, Rice University, Houston, TX
2018-2021 Troy Hendrikson, MD/PhD Biomedical Engineering, Texas A& M, College Station, TX

Prof. Tasciotti mentored 24 master degree students (01-01-2009 to 31-12-2016).

2009-2010 Kim Ferrari, MS in Biology at Trinity University, Austin, TX
2009-2010 Lucas Isenhardt, MS in Biology at University of Houston, Houston, TX
2010–2011 Chibuike Ofoegbuna, MS in Biomedical Engineering, University of Houston, TX
2010-2012 Seth Haddix, MS in Biology at McGill University, Montreal, Quebec, Canada
2012 Michael Vincent Frazier, MS in Biomedical Engineering at University of Houston, TX
2011 Maryam Fatouraei, MS in Computer Science at Houston College, Houston, TX
2011–2012 Shilpa Scaria, MS in Biomedical Engineering at University of Houston, Houston, TX
2012–2013 Michael Evangelopoulos, MS in Biomedical Engineering, University of Houston, TX
2013 Julianna Swartzenberg, MS in Biomedical Engineering, Purdue University, IN
2013-2014 Stefania Acciardo, MS in Biomedical Engineering at Politecnico of Turin, Italy
2013-2014 Marta Anna Balliano, MS in Biomedical Engineering at Politecnico of Turin, Italy
2013-2014 Sarah Hmaidan, MS in Biology at Baylor University, Houston, TX
2013 Zachary Mills, MS in Material Science, Rice University, Houston, TX
2013 Evan Byan, MS in Biomedical Engineering, Rice University, Houston, TX
2014 Nupur Basu, MS in Microbiology, University of Texas, Austin, TX
2014 Armando Torres, MS in Organic Chemistry, Xochicalco University, Baja California, Mexico.
2015 Katy Lipscomb, MS in Chemistry, Trinity University, Austin, TX
2015 Kelly Hartman, MS in Molecular Biology at Ohio University, Columbus, OH
2015 Francisco Jimenez, Biochemistry, University of St. Thomas, Houston, TX

2016 Jessica Hoffman, MS in Biochemistry, University of North Carolina, Chapel Hill, NC
2016 Aaron Shi, MS in Engineering, Rice University, Houston, TX
2016 Jocelyn Campa, MD in Medicine, Tecnológico de Monterrey, Monterrey, Mexico
2016 Ramiro Villareal, MD in Medicine, Tecnológico de Monterrey, Monterrey, Mexico
2016 Amber Chen, MS in Molecular Biology, John Hopkins University, Baltimore, MA

RESEARCH SUPPORT - CURRENT

(over \$2.5 M of funding from 2022):

1. Brain connectivity analysis to predict post stroke outcomes following traditional and enhanced neurorehabilitation by transcranial direct current stimulation and anti-inflammatory biomimetic nanoparticles. RF-2021-12373484. Importo finanziato **€450.000**
2. Brain connectivity and complexity parameters to monitor disease progression in dementia patients and antiinflammatory nanotherapeutics in a preclinical model of Alzheimer's disease PNRR-MAD-2022-12376667. Finanziamento **€1.000.000**
3. Multiscale integrated approach to the study of the nervous system in health and disease con coinvolgimento in: Spoke 6, Neurodegeneration, trauma and stroke; Spoke 7, Neuroimmunology and Neuroinflammation MNESYS. Finanziamento **€ 901.670,00**
4. Pain After Covid Multidisciplinary Action Network (PACMAN), a multidisciplinary consortium for the advancement of the understanding and treatment of chronich pain (NEURON_NW-020). Finanziamento **€250.000**.

RESEARCH SUPPORT – COMPLETED

(over \$30 M of funding from 2007-2021):

1. Nanovectors for Characterization and Destruction of Breast Tumor Vasculature
National Institute of Health/National Cancer Institute (R01CA128797-03)
Role: Co-Investigator (09/28/2007-07/31/2011) **\$273,000**
2. Nanoparticles for Harvesting and Targeting Angiogenic Proteins
National Institute of Health/National Cancer Institute (R33CA122864)
Role: Co-Investigator (09/01/2008-8/31/2012) **\$375,000**
3. BioNanoScaffolds (BNS) for Post-Traumatic Osteoregeneration
Department of Defense, Defense Advanced Research Projects Agency (W911NF-09-1-0044)
Role: Co-Investigator (01/01/2009-12/31/2010) **\$7,865,000**
4. Individualized cancer therapy: Leveraging medicine with multistage vector technology
Department of Defense CDMRP BCRP (W81XWH-09-1-0212)
Role: Co-Investigator (03/01/2009-02/28/2010) **\$1,386,000**
5. BioNanoScaffolds (BNS) for Post-Traumatic Osteoregeneration
Department of Defense, Defense Advanced Research Projects Agency (W911NF-11-1-0266)
Role: Principal-Investigator (10/01/2010- 8/10/2013) **\$828,000**
6. A hybrid “leukolike” multistage delivery system to overcome biological barriers
Department of Defense, Alliance for Nano-Health (ANH) Seed Grant (W81XWH-10-2-0125)

Role: Co-Investigator (04/15/2011 - 04/14/2013) **\$151,000**

7. Cell-mediated targeted delivery of nanoparticles for anti-tumor effect

Alliance for NanoHealth Collaborative, Multi-Institutional Center Grant (W81XWH-09-2-0139)

Role: Co-Investigator (09/30/2011–09/28/2013) **\$200,000**

8. Targeted Multistage Vector for the Diagnosis and Treatment of tumors of the intestinal tract.

Italian Ministry of Health (RF-2010-2305526 – PI: Nitti)

Role: Co-Investigator **\$252,500**

9. Leukosomes for the Targeted Treatment of Inflamed Endothelial and Atherosclerotic Plaques

George and Angelina Kostas Research Center

Role: Principal Investigator (07/01/2014-06/31/2015) **\$100,000**

10. Transport, diffusion and retention phenomena of nanovectors in the tumor parenchyma

NIH; PSOC Pilot Project (5U54CA143837)

Role: Principal-Investigator (03/01/2014-02/28/2015) **\$50,000**

11. Neuroregenerative Medicine Research Project

Brown Foundation for Healthcare

Role: Principal Investigator (05/01/2012-04/31/2015) **\$200,000**

12. Leukocyte Membrane Cloaked Carriers to Target and Overcome Tumor Vasculature

National Institute of Health/National Cancer Institute (1R21CA173579-01A1)

Role: Principal Investigator (07/01/2013-06/30/2015) **\$275,000**

13. Multistage Vector-Enabled Breast Oncology

Department of Defense (W81XWH-12-10414)

Role: Principal Investigator (09/30/2012-09/29/2017) **\$250,000**

14. New nanotechnology and biomedical approaches to improve postoperative pain treatment reducing the risks related to opioids.

Italian Ministry of Health (GR-2010-2318370, PI: Allegri)

Role: Co-Investigator (01/01/2013-12/31/2016) **\$1,275,000**

15. Novel surface targets for tailored nanotechnology-based drug delivery in colorectal cancer

Italian Ministry of Health (RF-2010-2318372 PI: Salvatore)

Role: Co-Investigator (01/01/2013-12/31/2016) **\$800,000**

16. Biomimetic Drug Delivery

Hearst Foundation

Role: Principal Investigator (07/30/2014-12/31/2016) **\$250,000**

17. Biomimetic Regenerative Medicine Program

The Cullen Trust for Health Care

Principal Investigator (01/01/2014-04/30/2019) **\$3,000,000**

18. Spinal Cord Injury Research

Department of Defense (W81XWH-14-1-0600)

Co-Investigator (09/30/2015-09/29/2020) **\$555,000**

19. A GMP/GLP investigation of degradable polymeric shells for traumatic osteoregeneration

U.S. Army Medical Research and Materiel Command (USAMRMC W81XWH-BAA-14-1)

Principal Investigator (01/01/2015-12/31/2021) **\$6,271,500**

20. A proteomic approach for the optimization of personalized biomimetic nanoparticles (BNV) Cariparo Foundation

Principal Investigator (04/01/2016-03/31/2020) **\$493,000**

- 21. EAGER: Biomanufacturing: Cell Differentiation Bioreactor For Cardiac Tissue Engineering**
National Science Foundation (PI: Jeffrey Jacot)
Co-Investigator (09/15/2016 – 08/31/2019) **\$300,000**
- 22. Targeting the Inflammatory Cancer Stem Cell Microenvironment of Triple Negative Breast Cancer with Leukocyte-mimetic Nanovesicles**
CPRIT (RP170466)
Principal Investigator (12/01/16 - 11/30/20) **\$897,000**
- 23. Biomimetic nanovesicles to overcome multiple physiological barriers for primary and metastatic triple negative breast cancer therapy**
National Cancer Institute (R56 CA213859-01)
Principal Investigator (9/01/2017 to 8/31/2020) **\$393,500**
- 24. RNAi approaches delivered through biomimetic nanoparticles to target EZH2 in pediatric soft-tissue sarcomas**
Italian National Cancer Institute (PI: Zaffaroni)
Co-Investigator (11/1/2017-10/30/2020) **\$431,500**
- 25. A New Biomimetic Approach in the Treatment of Cardiovascular Inflammation**
Kleberg Foundation
Principal Investigator (01/01/2018 to 12/31/2021) **\$867,500**
- 26. Cardiopatch: a biomimetic scaffold to fix congenital heart defects**
Men of Distinction
Principal Investigator (05/01/2018 to 04/30/2020) **\$100,000**
- 27. Reverting Inflammatory Bowel Disease with biomimetic Nanoparticles**
Underwood Center for Digestive Diseases
Co-Principal Investigator (01/01/2018 to 12/31/2020) **\$200,000**
- 28. Targeting the metastatic sarcoma niche using leukocyte biomimetic nanoparticles**
Cancer Prevention Research Institute of Texas (CPRIT)
Principal Investigator (03/01/2018-02/28/2021) **\$1,199,500**
- 29. Imaging elevated interstitial fluid pressure in tumors using ultrasound elastography**
National Institute of Health
Co-Investigator (09/30/2018-09/29/2021) **\$416,500**
- 30. Assessment of breast cancer mechanopathology markers using ultrasound**
Department of Defense, Breast Cancer Research Program
Co-Principal Investigator (09/30/2018-09/29/2021) **\$480,000**

SERVICE ON REVIEW PANELS & STUDY SECTIONS

International Scientists and Scholars in North America Foundation (ISSNAF) (2010-2016)
NIH IMAT Panel on “Innovative Technologies Development” (2010, 2014, 2016, 2017)
French National Cancer Institute (INCa) (2010, 2012, 2014)
U.S.-Israel Binational Science Foundation (2012, 2015, 2017)
NIH Drug Discovery and Molecular Pharmacology Study Section (2014)
DoD USA-MRMC Congressionally Directed Medical Research Programs (CDMRP) (2014-present)
The University of Strasbourg Institute for Advanced Study (USIAS) (2015)
NIH Image Guided Drug Delivery in Cancer Study Section. (2015-present)

DoD Nanomaterials for Bone Regeneration Focused Program Award Study Section (2015-2017)
The Israel Science Foundation (ISF) (2015-present)
NIH Enabling Tissue-Engineered Technologies for Cancer Research (U01 program) (2016)
Swiss National Science Foundation (2016)
NIH Image Guided Drug Delivery (Special Emphasis Panel) (2016-present)
NIH National Institute of Biomedical Imaging and bioengineering (Special Emphasis Panel on Regenerative Medicine Innovation project) (2017)
French research national agency (2017-2019)
European Research Council Grants (2018)
National Cancer Institute: "Clinical and Translational Exploratory/Developmental Studies (2018)
DoD CDMRP Breast Cancer Research Program Clinical and Experimental Treatment (2018)
NIH NIDDK: Immune System Engineering For Type 1 Diabetes. RFA-DK-17-020 (2018)
NIH Drug Discovery and Molecular Pharmacology (DMP) Study Section (2019)
NIH ESI MIRA Biotech Panel (Special Emphasis Panel) (2019)
Netherlands Organization for Scientific Research (2019)
Austrian Science Fund (2019)
Horizon Europe: ERA4Health NANOTECMEC (2023-2024)

SCIENTIFIC REVIEWER

Nature Materials
Nature Biotechnology
Nature Nanotechnology
Nature Methods
Nature Protocols
Nature Biomedical Engineering
Science Translational Medicine
Advanced Materials
ACS Nano
Advanced Drug Delivery Reviews
Materials Today
Small
Biomaterials
Acta Biomaterialia
Advanced Healthcare Materials
ACS Applied Materials & Interfaces
Advanced Functional Materials
Biomedical Microdevices
Clinica Chimica Acta
Journal of Biological Chemistry
Molecular Imaging
Nanomedicine & Nanobiotechnology
Journal of the American Chemical Society

Biomedical Nanotechnology
Drug Development
Journal of Physical Chemistry
Journal of Biomaterials Science
Journal of Biomedical Nanotechnology
Journal of Medicinal Chemistry
Chemical Research in Toxicology
Pharmaceutical Science and Technology
Cancer Research Journal
Journal of Visualized Experiments
International Journal of Molecular Sciences
Journal of Applied Biomaterials & Functional Materials
Material Sciences and Nanotechnology
Molecular Imaging
Molecular Pharmaceutics
Trends in Biotechnology
Trends in Immunology

MEMBERSHIPS TO PROFESSIONAL SOCIETIES

Biomedical Engineering Society (2006-present)
American Association for Cancer Research (2006-present)
Society for Molecular Imaging (2007-present)
American Association for the Advancement of Science (2009-present)
American Chemical Society (2009-present)
Controlled Release Society (2010-present)
Society for Biomaterials (2010-present)
American Society for Cell Biology (2015-present)
International Cartilage Repair Society (2017-present)

KEY SCIENTIFIC CONTRIBUTIONS

1. Drug delivery. I have conducted extensive research into the utilization of micro-, nano-, and bio-materials for drug delivery purposes. By integrating nanotechnology with cell biology, I have developed groundbreaking medical tools that operate in harmony with natural laws. Specifically, my focus has been on designing implantable and injectable platforms to surmount biological barriers, target inflammation, administer drugs for cancer treatment, and modulate immune responses. The creation of the Multi Stage Vector, featured as the cover story in Nature Nanotechnology in December 2008, marked the inception of targeted chemotherapy nanosystems. This breakthrough was recognized as one of the "Five big ideas for nanotechnology" in Nature Medicine in 2009, sparking a new era of exploration into multi-stage delivery. To date, nearly 250 peer-reviewed papers have been published on this technology, which is currently undergoing clinical translation by a private entity. Furthermore, my research in drug delivery has led to the development of additional platforms capable of traversing

biological barriers. I introduced the innovative use of biomimicry principles to engineer bioinspired systems that evade reticulo-endothelial clearance, target inflamed vessels, traverse endothelial layers, and enhance therapeutic accumulation in cellular cytoplasm. Noteworthy contributions include the Leuko-Like Vector (Nature Nanotechnology, 2013), porous nanoneedles (Nature Materials, 2015), and exosome-like vesicles (Nature Materials, 2016). Presently, my research endeavors are focused on creating universal delivery systems tailored to target inflammation and release disease-specific drugs and molecules.

2. Regenerative Medicine. I have contributed to the understanding of the remarkable healing potential inherent within the human body and endeavored to maximize it by engineering biomimetic scaffolds capable of eliciting targeted cell and tissue responses. Our materials are meticulously crafted to emulate the natural tissue response observed during physiological healing processes. Through our investigations, we have demonstrated that both immune and stem cells exhibit distinct responses to implanted materials based on their composition, structure, and surface characteristics. Our pioneering work in tissue engineering has led to the development of scaffolds and membranes that closely mimic native tissue at both nano- and micro-scales, thereby imbuing synthetic constructs with the functional properties of natural tissues. Despite the persistent demand for surgical products with optimal properties in regenerative medicine, there remains an ongoing need for innovation. Personally, my focus lies in the advancement of translational biomaterials for musculoskeletal tissue engineering. Musculoskeletal tissues comprise complex structures encompassing cartilage, bone, tendons, ligaments, and connective tissue, often interconnected in a continuous manner. Current approaches often face limitations in regenerating individual tissues separately. My approach involves mimicking the extracellular matrix of multiple tissues to facilitate superior regeneration of composite tissues.

3. Immune and stem cell biology. I made significant contributions to the understanding of stem cells and immune cells response to biomaterials. Our research has shown that it is feasible to influence cell fate within the body directly, eliminating the need for ex vivo cell expansion or manipulation. This approach streamlines the FDA approval process and expedites the clinical translation of implantable scaffolds. While many research groups were focused on developing tissue engineering techniques involving bioreactors and ex vivo cell culture on scaffolds, we were among the pioneers in developing technologies that harness the activity of immune cells as initial responders following injury, aiming to recruit stem cells and facilitate neoangiogenesis. Our innovative approach to biomaterials engineering centers on regulating the response of inflammatory cells to the implant. We have demonstrated that regenerative processes rely on intricate interactions among multiple cell types, influenced by the chemical and physical signals present in the surrounding microenvironment. By deciphering the cascade of inflammatory events triggered by the host's immune system in response to implanted biomaterials, we have shown that activation of M1 macrophages can lead to detrimental immune dysfunction, fibrosis, and pathological complications. Conversely, M2 switching is associated with accelerated tissue healing and can prevent scar tissue formation. To enhance implant biocompatibility and reduce

immunogenic responses, my team has developed several immune-instructive biomaterials capable of modulating the immune response to promote improved tissue regeneration.

4. Translational research. Expanding the scope of biomimetic approaches to unresolved clinical challenges, I initiated a program focusing on the utilization of platelet-rich plasma (PRP) as a biomaterial in regenerative medicine. Our investigations revealed that this blood-derived product substantially enhances early neovascularization and tissue deposition, while also modulating immune responses and mitigating host degradation of biologic matrices. We delved into the exploration of innovative regenerative matrices, including repurposed lung tissue, which, following a sophisticated decellularization process, offers architectural and biochemical cues to native cells, thereby enhancing incorporation, cellularization, and neovascularization. Additionally, we played a pivotal role in the advancement of novel imaging techniques, such as ultrasound elastography, to elucidate the progressive mechanisms involved in both hard and soft tissue healing. Collectively, these discoveries hold profound and immediate translational implications for improving human surgical procedures, diagnosis, and healing processes moving forward.

INVITED LECTURES: Selected from over 80 seminars and invited lectures in universities and research centers in the United States, Canada, Europe, China, and Japan.

“Nanotechnology in Medicine: Lessons Learned and New challenges.” International Conference on Computational Surgery. Boston, MA. (10 December 2012)

“Biomimetic Strategies to Target and Tune Inflammation.” Hamon Center Lab Conference: Cancer Symposium. Dallas, TX. (12 March 2015)

“How nanomaterials will change the way we practice medicine.” The Department of Surgery Grand Rounds. MD Anderson Cancer Center, Houston, TX. (14 October 2015)

“Nanotechnology in Pain Medicine.” American Society of Regional Anesthesia and Pain Medicine. Miami, FL. (20 November 2015)

“Biomimetic proteolipid vesicles derived from immune cells.” American Society for Cell Biology Annual Meeting. San Diego, CA. (12 December 2015)

“Biomimetic materials to overcome biological barriers in drug delivery & tissue engineering.” Biomaterials Day. Rice University. Houston, TX. (1 June 2015)

“Membrane Source determines fate of biomimetic particle.” World Conference on Nanoengineering for Medicine and Biology. San Francisco, CA. (2-5 February 2014)

“Biologically Inspired Scaffold Mimicking Trabecular Bone for Spinal Fusion.” Society For Biomaterials. Charlotte, North Carolina. (15-18 April 2015)

“Nanotechnology platforms for acute post surgical pain.” American Society of Regional Anesthesia and Pain Medicine. Miami, FL. (November 21-24 2015)

“Promoting musculoskeletal repair and physiologic tissue homeostasis through the mimicking of the regenerative niche.” Nature Conference on Tissue Engineering and Regenerative Medicine. Guangzhou, China. (6-9 April 2016)

“Biomimetic interfaces to trigger tissue restoration.” World Biomaterials Conference, Montreal, QC. (17-22 May 2016)

“Targeting inflammation and tuning the immune response using biomimetic nanomaterials.” Center for Prevention of Obesity. Omaha, NB. (18 April 2016)

“Cellular vectors to enhance the pulmonary delivery of chemotherapeutics.” World Drug Delivery Summit. New Orleans, LA. (30 June – 02 July 2016)

“Biomimetic Liposome-like Nanovesicles able to Target and Modulate Inflammation.” Clinical NanoMedicine Conference (CLINAM). Basel, Switzerland. (May 7 -10, 2017)

“Biomimetic Engineering of Materials to Tune Immune Response and Inflammation.” Cancer Nanotechnology Gordon Research Conference, Mt. Snow, VT. (June 18-23, 2017)

“Synthetic proteolipid vesicles mimicking leukocyte membrane function.” Nano Drug Delivery Symposium, Ann Arbor, MI. (September 22-24, 2017)

“Targeting Cancer Inflammatory Microenvironment with Biomimetic Nanoparticles.” End2Cancer conference, Oklahoma City, OK. (December 14-15, 2017)

“Designing materials to increase the nano-bio interface.” University College Dublin, Centre for BioNano Interactions, Dublin. (May 15, 2018)

“Targeting inflammation with immune derived nanoparticles.” Technical University of Denmark, Copenhagen, Denmark. (May 18, 2018)

“Nanoparticles for nucleic acid therapy.” Advancing Toward a One-Time Cure. Cystic Fibrosis Foundation Research Conference, Jackson, WY. (June 22-24, 2018)

“How to Target Inflammation and Tune the Immune Response with Biomimetic Nanoparticles.” Center for Molecular Imaging and Nanotechnology (CMINT) Memorial Sloan-Kettering Cancer Center. New York, NY. (June 20, 2019)

“What is the future of cancer nanomedicine and what can we learn from past failures” Gordon Research Seminar on Cancer Nanotechnology. West Dover, VT. (June 22-26, 2019)

“Biomimetic materials to tune immune response and direct stem cell lineage” UTHealth School of Dentistry. Houston, TX. (September 4, 2019)

“Immune tuning and anti-inflammatory response to nano and biomaterials” Center for Inflammation and Immunology, Humanitas Clinical and Research Center. Milan, Italy. (September 26, 2019)

“Targeting Inflammation with Biomimetic Nanomaterials” Nanoscience and Nanotechnology for Medical Applications, Tel Aviv university. Tel Aviv Israel (October 29-30, 2019)

PODIUM PRESENTATIONS: Selected from over 250 international scientific meetings. Over 500 scientific communications have been presented by members of my team and collaborators.

“Nanoporous Silicon as a Platform for Targeted Drug Delivery and Discovery of Proteomic Signatures for Cancer Diagnostics.” **Nanomaterial and Telemedical Conference**, Montreal, Canada. (24 – 28 February 2009)

“Nanotechnologies and the Individualization of Medicine.” **American Association for Cancer Research Centennial Meeting**, Denver, Colorado. (17 – 21 April 2009)

“Stem cell-directed theranostic nanovectors for cancer intervention.” **TechConnect World**. Anaheim, CA. (21-25 June 2010)

“Trifunctional Porogens for the Development of an Injectable Putty to Treat Traumatic Bone Defects.” **Controlled Release Society Meeting**. Portland, Oregon. (10-14 July 2010)

"Nanoporous silicon nanoneedles for intracellular delivery of siRNA." **International Conference on Science and Technology**. Madrid, Spain. (28 March – 1 April 2012)

"Injectable and implantable biomimetic materials for tissue engineering" **World Biomaterials Conference**, Chengdu, China. (5-12 June 2012)

"Multidisciplinary approaches in Nanomedicine." **Building Global Engagements in Research**. Swansea, UK. (25-27 February 2013)

"Healing tissues through biomimetic materials." **Materials in Medicine International Conference**. Faenza, Italy. (8-11 October 2013)

"Bioengineered Nanoporous Silicon with Leukocyte Membrane Promotes Endothelial Adhesion." **Biomedical Engineering Society Meeting**. San Antonio, Texas. (24 October 2014)

"Targeting inflammation with biomimetic materials." **Engineering in Medicine and Biology. Micro and Nanotechnology in Medicine Conference**. Oahu, Hawaii. (8-13 December 2014)

"Biomimetic approaches for tissue healing and restoration." **Society For Biomaterials**, Charlotte, North Carolina. (15-18 April 2015)

"Engineering Tissue Interfaces." **Tissue Engineering and Regenerative Medicine International Society**. Boston, MA. (20 September 2015)

"Leukocyte-based Biomimetic Nanovesicles for the Imaging of Inflamed Vasculature." **NanoEngineering for Medicine and Biology Conference**. Houston, TX. (February 2016)

"Modeling breast cancer with tridimensional biomimetic scaffolds." **Clinical Nanomedicine Conference**, Basel, Switzerland. (26-29 June 2016)

"Biomimetic Nanomaterials for Drug Delivery and Tissue Engineering." **NanoWorld Conference**. Boston, MA. (4-6 April 2016)

"Multifunctional Fibrin/PEG Hydrogels for Congenital Heart Repair." **World Biomaterials Congress**, Montreal, QC. (17-22 May 2016)

"Drug Delivery Systems to Overcome Biological Barriers." **World Drug Delivery Summit**, New Orleans, LA. (30 June – 02 July 2016)

"Biomimetic Liposome-like Nanovesicles able to Target and Modulate Inflammation." **10th European & Global Summit Nanomedicine**. Basel, Switzerland. (7-10 May 2017)

"Biomimetic nanomaterials to target inflammation and tune immune response." **National Institute for Health-National Cancer Institute Director's office**, Bethesda, VA. (17 April 2018)

"Induction and Modulation of Immune Response for Tissue Regeneration." **Tissue Engineering and Regenerative Medicine International Society**. Kyoto, JP. (4-8 September 2018)

"Biomimetic Scaffolds to Modulate Inflammation and Improve MSC Inflammatory Targeting" **Biomedical Engineering Society 2019 Annual Conference**. Philadelphia, PA. (17 October 2019)

OUTREACH PRESENTATIONS: I have been active in the dissemination of science and regularly participate in round tables and conferences for the general public. This included presentations at philanthropic events which raised over \$5 M for my own laboratory and \$25 M for my institute. The following are selected from a list of over 50 public engagements:

"**Nationwide celebration of nanotechnology for children and families.**" NanoDay and ScienceDay. These are two annual hands-on festivals where youngsters celebrate the wonders of science. Designed for junior scientists in grades K-12, this medical science and technology event

has hands-on activities the entire family can enjoy. Houston Methodist Research Institute, Houston TX. The events have been hosted regularly in Houston from 2013 to 2019.

“Regenerative Nanomedicine” Faith and Medicine Initiative. This initiative focused on the role of Supportive and Palliative Care service in the hospital setting. Guests had the opportunity to hear from and interact with experts in pain therapy and palliative care, and to gain a better understanding of how they can be best integrated into the health care teams. River Oaks Country Club, Houston TX. 21 October 2013.

“Leukosomes vesicles to target cardiovascular diseases” Congressional Delegation Visit, Hosting Congressman John Culberson, member of the House Appropriations Committee, and chair of the Subcommittee on Commerce, Justice, and Science (CJS). The CJS Subcommittee has jurisdiction over the Department of Commerce, Department of Justice, NASA, the National Science Foundation, and other related agencies. Washington DC, 9 January 2014.

“Bone Putty Regenerative Tissue” Congressional Delegation Visit, Hosting Congressman Gene Green. Houston Methodist Research Institute. Houston, TX. 25 Aug 2014.

“From Science Fiction to Reality and Running Backward in Time.” Houston Methodist Research Institute, Houston TX. 21 October 2014.

“Your Future with Nanomedicine.” Houston Rotary Club Fundraising Event, with the participation of the Oil and Gas executive community. Houston, TX. 06 November 2014.

“Musculoskeletal tissue repair with immune instructing materials.” Congressional Delegation Visit of Congressman Pete Olson. Houston Methodist, TX. 14 December 2014.

“Regenerative Medicine.” The Bush Family Campaigning Tour. An exclusive reception featuring the latest advances in medical research aimed at treating society’s most devastating diseases. Clinicians and scientists shared their insight on the Translational Research Initiative an innovative approach to translate discoveries made in the laboratory into new diagnostics, therapies and treatments. Houston Methodist Research Institute. Houston, TX. 27 April 2015.

“Targeted cancer therapy using nanoparticles for drug delivery.” TRI Reception hosted by Veronica Selinko-Curran and Mike Curran. An evening reception featuring clinicians and researchers from the Texas Medical Center. The event showcased biomeical innovations already underway to address some of society’s most challenging diseases and conditions. Houston Methodist Research Institute, Houston, TX. 30 March 2016.

“Regenerative Engineering: how to leverage on the lessons learned from Nature.” Maria Bush Campaigning Tour. Houston Methodist Research Institute. Houston, TX. 27 April 2015.

“Biomimetic Strategies for the Treatment of Atherosclerosis.” George and Angela Kostas Center for Cardiovascular Nanomedicine. Houston, TX 12 October 2015.

“3D biomimetic scaffolds: a tissue-like context for studying tumor biology and drug response.” Scientists Meet the Patients Symposium. Houston, TX 2015. 46.

“Building bionic nanomachines to overcome biological barriers” Atomic Precision for Medical Applications. A highly interactive and stimulating invitational meeting focused on long-term prospects for revolutionary advances in medical applications based on improved precision in our control of matter, and how to spend current research in that direction. Foresight Institute. San Jose, California. 29-31 May 2015.

“The Benefits of Scientist-Clinician Driven research.” The Society for Leading Medicine’s Night at the Research Institute. This event gives the opportunity to the members of The Society for

Leading Medicine and their families to enjoy a night of exploration and to learn about nanoscience, technology and medicine. Houston Methodist, Houston, TX. 26 September 2016.

“To kill cancer you have to think like a cell” TedX-Talk CNR: 10 October 2016, Rome, Italy

“Approaches to the treatment of inflammation in traumatic injuries” Brain & Bone Collaborative Event. The event was organized to increase awareness and gain support of the concussion and traumatic brain injury program at Houston Methodist. Houston Methodist Research Institute, Houston, TX. 03 April 2017.

“Specialized leukosome for the treatment of Inflammatory Bowel Disease” Gastroenterology Task Force Meeting. The GI Task Force aims to increase awareness and gain more support from the families of patients affected by incurable digestive disorders. The David M. and Lynda K. Underwood Center for Digestive Disorders. Houston, 10 April 2017.

“Biomimetic Scaffolds for the Treatment of Musculoskeletal Injuries” Brain & Bone Collaborative Center, Presentation to further engage individuals with an interest in Sports Medicine, Orthopedics and Concussion. Jon Deutser Residence, 19 October 2017.

“Personalized nanomedicine approaches to inflammatory conditions” This luncheon engaged special guests in The Power of M Campaign and The Centennial Chair Challenge. Luncheon hosted by Claudia and Roberto Contreras, 5 December 2017.

“New approaches to musculoskeletal regeneration” The Breakfast Club. A networking and fundraising event including 50 top executives from the oil and gas industry. River Oak Country Club, Houston, August 22, 2018.

“Immunology Reception.” A reception hosted by Cindy and Don Poarch featuring Houston Methodist Immunology Center and David Huston, MD. Poarch Residence, 21 March 2019.

“What it takes to be a scientist today” STE(A)M IT project, European Community, Sept 2020.

PATENTS

Biomimetic proteolipid vesicle compositions and uses thereof

Publication number: 20190167589 **Abstract:** Disclosed are biomimetic proteolipid nanovesicles that possess remarkable properties for targeting compounds of interest to particular mammalian cell and tissue types. In particular embodiments, drug delivery vehicles are provided composed of synthetic phospholipids and cholesterol, enriched of leukocyte membranes, and surrounding an aqueous core. These properties make the composition highly suited for targeted drug delivery to mammalian tumor cells in vitro and in situ.

Filed: August 22, 2018 **Publication date:** June 6, 2019 **Applicant:** Houston Methodist Hospital **Inventors:** Ennio Tasciotti, Roberto Molinaro

Trizonal membranes for periosteum regeneration

Publication number: 20190151510 **Abstract:** Disclosed are trilaminar collagen-based tissue scaffolds that exhibit remarkable morphological mimicry to that of the natural mammalian periosteum tissue they are useful in remodeling. In particular embodiments, periosteum-modeling trizonal membranes for reforming and regrowing human bone tissue are provided that are composed of a first zone of compact collagen, a second layer of collagen-elastin, and a third layer of biomineralized collagen.

Filed: August 22, 2018 **Publication date:** May 23, 2019 **Applicant:** Houston Methodist Hospital
Inventors: Ennio Tasciotti, Francesca Taraballi, Silvia Minardi

Microfluidic-formulated leukosome compositions and fabrication methods therefor

Publication number: 20190117572 **Abstract:** Disclosed are methods for designing and manufacturing biomimetic proteolipid nanovesicles using a microfluidic approach for the high-throughput, reproducible, and scalable production of nanoparticles, without affecting their pharmaceutical and biological properties. These nanovesicles, which are composed of synthetic phospholipids and cholesterol, enriched of leukocyte membranes, and surrounding an aqueous core, possess remarkable properties for targeting compounds of interest to particular mammalian cell and tissue types.

Filed: March 7, 2018 **Publication date:** April 25, 2019 **Applicant:** Houston Methodist Hospital
Inventors: Ennio Tasciotti, Roberto Molinaro

Biodegradable scaffolds

Publication number: 20190001025 **Abstract:** In some embodiments, the present invention provides compositions that comprise: (1) a biodegradable polymer matrix; and (2) at least one biodegradable reinforcing particle that is dispersed in the matrix. In some embodiments, the biodegradable reinforcing particle is selected from the group consisting of porous oxide particles and porous semiconductor particles. In additional embodiments, the compositions of the present invention further comprise a (3) porogen particle that is also dispersed in the matrix. In further embodiments, the compositions of the present invention are also associated with one or more active agents. In various embodiments, the active agents are associated with the biodegradable polymer matrix, the biodegradable reinforcing particle, and/or the porogen particle. In various embodiments, the compositions of the present invention may be utilized as scaffolds, such as scaffolds for treating bone defects.

Filed: August 27, 2018 **Publication date:** January 3, 2019 **Applicant:** Board of Regents of the University of Texas System **Inventors:** Mauro Ferrari, Rachel Buchanan, Christine Smid, Ennio Tasciotti

Multistage delivery of active agents

Publication number: 20190111000 **Abstract:** Multistage delivery vehicles are disclosed which include a first stage particle and a second stage particle. The first stage particle is a micro or nanoparticle that contains the second stage particle. The second stage particle includes an active agent, such as a therapeutic agent or an imaging agent. The multistage delivery vehicle allows sequential overcoming or bypassing of biological barriers. The multistage delivery vehicle is administered as a part of a composition that includes a plurality of the vehicles. Methods of making the multistage delivery vehicles are also provided.

Filed: October 12, 2018 **Publication date:** April 18, 2019 **Applicants:** Board of Regents of the University of Texas System, The Ohio State University Research Foundation **Inventors:** Mauro Ferrari, Ennio Tasciotti, Jason Sakamoto

Implantable electrospun patches for site-directed drug delivery

Publication number: 20180361032 **Abstract:** Disclosed are biocompatible, biodegradable, implantable devices for the controlled release of bioactive molecules. In particular embodiments, nanotechnology-based tunable implants are disclosed for 1) localized delivery of analgesics to treat postoperative pain; 2) sustained delivery of growth factors to promote vascularization; and 3) directing tissue regeneration, including the self-direction of autologous stem cells for organ remodeling.

Type: Application **Filed:** August 22, 2018 **Publication date:** December 20, 2018 **Inventors:** Ennio Tasciotti, Francesca Taraballi, Silvia Minardi

Modular device for preventing compression and instability in a segmental defect repair

Publication number: 20170086978 **Abstract:** The present invention relates to a polymer scaffold design and method for treating segmental long bone defects without amputation that permits permanent regrowth of bone in the area of the segmental defect, without external fixation or other problems inherent in current systems. The polymer scaffold is preferably made from a poly(ester urea) polymer and includes an outer shell, sized to fit over a segmental defect in a bone, and a collagen containing material. In some embodiments, the collagen containing material is placed in a polymer insert sized to fit within the segmental bone defect and within said outer shell. In some embodiments, the outer shell may contain struts running longitudinal struts along the inside surface of the outer shell. In some of these embodiments, the insert will have a corresponding set of grooves sized to receive the struts.

Filed: May 13, 2015 **Publication date:** March 30, 2017 **Applicants:** The University of Akron, Houston Methodist Hospital **Inventors:** Matthew Becker, Ennio Tasciotti, Bradley Weiner

Theranostic delivery systems with modified surfaces

Publication number: 20130071329 **Abstract:** The present invention pertains to therapeutic compositions and delivery systems comprising at least one microparticle or nanoparticle. In various embodiments, the surface of the microparticle or nanoparticle is modified or functionalized with at least a portion of an isolated cellular membrane, such as an isolated plasma membrane. In addition, the microparticle or nanoparticle contains at least one active agent, such as a therapeutic and/or imaging agent. In additional embodiments, the compositions and delivery systems of the present invention may be used for targeted delivery of an active agent. Also provided are methods of making the therapeutic compositions and delivery systems of the present invention.

Filed: March 17, 2011 **Publication date:** March 21, 2013 **Applicant:** Board of Regents of the University of Texas System **Inventors:** Mauro Ferrari, Ennio Tasciotti, Nicoletta Quattrocchi

Universal cell-directed theranostics

Publication number: 20130071326 **Abstract:** The present invention provides modified stem cells that comprise a delivery system that comprises at least one microparticle or nanoparticle, wherein the at least one microparticle or nanoparticle comprises an active agent. The present invention also provides delivery methods that comprise the administration of the modified stem cells to a subject. Additional aspects of the present invention pertain to methods of making said modified stem cells.

Filed: March 17, 2011 **Publication date:** March 21, 2013 **Applicant:** Board of Regents of the University of Texas System **Inventors:** Jonathan O. Martinez, Ennio Tasciotti, Mikhail Kolonin, Mauro Ferrari

Combinatorial multidomain mesoporous chips and a method for fractionation, stabilization, and storage of biomolecules

Publication number: 20110065207 **Abstract:** A new fractionation device shows desirable features for exploratory screening and biomarker discovery. The constituent MSCs may be tailored for desired pore sizes and surface properties and for the sequestration and enrichment of extremely low abundant protein and peptides in desired ranges of the mass/charge spectrum. The MSCs are effective in yielding reproducible extracts from complex biological samples as small as 10 ul in a time as short as 30 minutes. They are inexpensive to manufacture, and allow for scaled up production to attain the simultaneous processing of a large number of samples. The MSCs are multiplexed, label-free diagnostic tools with the potential of biological recognition moiety modification for enhanced specificity. The MSCs may store, protect and stabilize biological fluids, enabling the simplified and cost-effective collection and transportation of clinical samples.

Filed: July 20, 2010 **Publication date:** March 17, 2011 **Applicant:** The Board of Regents of the University of Texas System **Inventors:** Mauro Ferrari, Xuewu Liu, Ennio Tasciotti, Ali Bouamrani

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Prof. Ennio Tasciotti has been included in the 2023 Stanford University Scientific Ranking as one of the Top1% most influential scientists worldwide.

(SCOPUS: 10,134 citations, H-index: 50 – GOOGLE SCHOLAR: 13,020 citations, H-index: 58)

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