Curriculum Vitae

INFORMAZIONI PERSONALI

Nome ANTONIO

Cognome D'AMORE

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FORMAZIONE TITOLI

Education

- **(11/2007 – 03/2011) Ph.D in Mechanical Engineering, focus on Tissue Engineering and Biomaterials, University of Palermo, Italy.** I was first in a national selection (score: **94/100**) for a Ph.D position funded by the Italian Ministry for University and Research (MIUR). PhD completed according to official transcript on the **03/25/2011**. Project in collaboration with the Bioengineering Department, **University of Pittsburgh, USA** and the **McGowan Institute for Regenerative Medicine**;
  - *Project supervisors:* Prof. Giovanni Petrucci, University of Palermo, Prof. Michael Sacks and Prof. William Wagner, University of Pittsburgh;
  - *Title:* "Structural Deterministic Modeling, Design and Fabrication of Electrospun Scaffolds for Soft Tissue Engineering";
  - *Founding sources*: NIH R01 HL-068816, MIUR.
  - *Project time length:* 36 months. I spent 30 months at the McGowan Institute For Regenerative Medicine , University of Pittsburgh, as Visiting Research Scholar.
  - *Research themes:*
    - structural characterization, design optimization and fabrication of tissue engineering scaffolds;
    - in vitro/vivo testing of optimized engineered soft tissues vs. conventional engineered soft tissues;
    - targeted clinical application: tissue engineered pulmonary valve;
- (11/2007) Master of Science degree in Biomedical Engineering and the Diploma of Imperial College, Imperial College London, United Kingdom. Full time MSc, advanced course of study, full title: "Engineering and Physical Science in Medicine", Department of Bioengineering. The course, is composed of 14 written exams, course work and a graduation thesis. Degree equivalent to the Italian "Laurea quinquennale in ingegneria biomedica". Aggregate mark for the course: 68.6% = merit. Final project title: "Numerical optimization algorithms for joints mechanics", keywords: musculoskeletal mechanics, human lower limbs, numerical optimization.
- **(07/2004) Master of Science degree in Mechanical Engineering, University of Palermo, Italy**. Five years degree equivalent to a four year Master of Engineering plus a one year MSc, full title: "Laurea quinquennale in ingegneria meccanica, vecchio ordinamento", Department of Mechanics, graduated with maximum marks and honours: **110/110 cum laude**. Graduation thesis: "Geometric modelling of human jaw starting from Computer Tomography data ", keywords: Structural Biomechanics, Human Jaw, CT scan, FEM.

Work experience

- **(03/2013 – present) Research associate and fellow of the Fondazione RiMED, University of Pittsburgh, USA** and the **McGowan Institute for Regenerative Medicine**
  - *Project PI:* A D'Amore, University of Pittsburgh;
  - *Title:* "Function Controlled Scaffolds for Improved Soft Tissue Remodeling**"**;
  - *Founding sources*: RiMED research supporting grant ($ 500.000 for 3 years) sponsored by the Fondazione RiMED in partnership with the University of Pittsburgh Medical Center (UPMC);
  - *Project time length:* 3 years.
  - *Research themes:*
    - structural characterization, design optimization and fabrication of tissue engineering scaffolds;
    - in vitro/vivo assessment of optimized engineered cardiac tissues;
    - targeted clinical application: cardiac patch, abdominal wall repair, engineered pulmonary valve, engineered vascular graft;
  - *Additional projects:*
    - Project leader and on 3 different in vivo validation study involving > 500 surgeries on different animal models, main activity: material fabrication and design, explants assessment, design of experiment;
- **(04/2013 –– present) Joint Post doctoral Fellowship at the DICGIM University of Palermo Italy. (Titolare Assegno ricerca)** research areas: tissue engineering, biomechanics and biomaterials.

- **(03/2011 – 02/2013) Fellow of the Fondazione RiMED/UPMC Italy and Post doctoral Researcher in Tissue Engineering and Biomechanics, University of Pittsburgh, USA** and the **McGowan Institute for Regenerative Medicine**
  - *Projects supervisors:* Prof. William Wagner, University of Pittsburgh;
  - *Titles:* 1) "Mechanical Conditioning and Regeneration of the Ischemic Ventricular Wall**",** 2) **"**Elastomeric scaffolds for abdominal wall defect repair and enhanced angiogenesis";
  - *Founding sources*: managed several founding sources including: Commonwealth of Pennsylvania 2011, Commonwealth of Pennsylvania 2012, winner of a post-doc fellowship + research grant ($ 375.000 for 5 years) sponsored by the Fondazione RiMED in partnership with the University of Pittsburgh Medical Center (UPMC);
  - *Project time length:* 5 years.
  - *Research themes:*
    - structural characterization, design optimization and fabrication of tissue engineering scaffolds;
    - in vitro/vivo assessment of optimized engineered cardiac tissues;
    - targeted clinical application: cardiac patch, myocardium wall, abdominal wall repair;
- **(06/2008) Consultant at the Institute for Industrial Promotion, Italian Ministry for Economic Development** (IPI). I joined a group of consultants in the investigation on the services for Innovation and Technology Transfer provided by 250 research centers of the Sicilian Innovation Network. Fields covered: Industrial Engineering, Physics applied to Medicine, Biotechnology;
  - project title: "Sicilian Network for Innovation and Technology", RESINT;
  - project funded by the 3.15 POR Sicilia 2000-2006;
- **(06/2006) Intern at University Campus Biomedico Rome.** Laboratory of Biomedical Robotics & EMC at Università Campus Bio-Medico. Main work activities included the Design and Fabrication of a Magneto Encephalo-Gram compatible force sensor for the MEG Unit at the Fatebenefratelli Hospital, Tiberina Island, Rome.

ATTIVITA' DIDATTICA

- **Short lectures** series on Cardiovascular Tissue Engineering, for the Master course in Biomedical Engineering , Biomaterials and Biomechanics provided by the University of Palermo, Italy, July 2013.
- **Biomechanics, 20 hrs course.** Advanced teaching programme organized by a leading global orthopaedic company (Lima Corporate) for 10 top engineers and biologists. National funding scheme: PON 01 01287: "Advanced solutions based on complex matrix biomaterials and minimally invasive techniques for cartilage repair and regeneration" February 2013 – February 2014 **Lima Corporate Academy,** Italy.
- **Short lectures** series for the Chemical Engineering PhD program. Department of Chemical Engineering, University of Pittsburgh**.** Title: " Electrospinning for soft tissue engineering applications", (03/2013).
- **Biomechanics, 40 hrs course.** Advanced teaching programme organized by a leading global orthopaedic company (Lima Corporate) for engineers and biologists. National funding scheme: PON 01 01287: "Advanced solutions based on complex matrix biomaterials and minimally invasive techniques for cartilage repair and regeneration" February 2012 – February 2013 **Lima Corporate Academy,** Italy.

RICERCHE FINANZIATE

- **Research projects devised and directly managed**
  - Armed Forces Institute of Regenerative Medicine II, W81-XWH-13-2-XXXX, $900,000 for 1/2014 - 12/2017 *Creating Innervated Vascularized Muscle Flaps from Elastic, Cellularized Biocomposites Developed in Situ for Facial Muscle Reconstruction.*

    PI: W. Wagner, Project Leader: **A. D'Amore,** University of Pittsburgh.

- RiMED Foundation Research Support, $500,000 for 2/2013 - 01/2016 *Function Controlled Scaffolds for Improved Soft Tissue Remodeling.* PI: **A. D'Amore**, Project Leader: **A. D'Amore,** University of Pittsburgh.
- RiMED Foundation Post Doctoral Training grant, $150,000 for 01/2011 - 01/2013 PI: W. Wagner, Project Leader: **A. D'Amore,** University of Pittsburgh.

  Function Controlled Scaffolds for Improved Cardiac Tissue Remodeling.
- Commonwealth of Pennsylvania Fiscal Year 2012, $70,000 for 10/2011 - 07/2012 PI: W. Wagner, Project Leader: **A. D'Amore,** University of Pittsburgh.

  Elastomeric scaffolds for abdominal wall defect repair and enhanced angiogenesis.
- Commonwealth of Pennsylvania Fiscal Year 2011, $70,000 for 10/2010 - 07/2011 PI: W. Wagner, Project Leader: **A. D'Amore,** University of Pittsburgh.

  Mechanical Conditioning and Regeneration of the Ischemic Ventricular Wall.

- **Main active collaborations**
  - NIH 5R01HL68816- *8, Biomechanical Optimization of Tissue Engineered Heart Valves.* PI: M. Sacks University of Texas at Austin, W. Wagner University of Pittsburgh, J. Mayer Children Hospital, Harvard University. Role: **A. D'Amore** (Leaflet fabrication and explants assessment).
  - NIH (NIBIB) 1R21EB016138, *Autologous Stem Cell-Based Tissue Engineered Vascular Grafts.* PI: D. Vorp. University of Pittsburgh. Role: **A. D'Amore** (Vascular graft fabrication).
  - NHLBI HL109132, *ROS Mechanisms in BAV Aortopathy.* PI: T. Gleason. CoI: J. Philippi, University of Pittsburgh. Role: **A. D'Amore** (Vascular graft fabrication).
  - NIH 5R01 AR054940-0. *Cellular Remodeling of ECM Scaffolds.* PI: S. Badylak , University of Pittsburgh. Role: **A. D'Amore** (ECM-polymeric scaffolds design and fabrication).
  - NIH R21 Application: 11528412. *Dysfunctional muscle remodeling and regeneration in environmental disease.* (under review) PI: F. Ambrosio, CoI: **A. D'Amore,** University of Pittsburgh. Role: (explants biomechanics, structural characterization and multi photon imaging).
  - NIH DP2 116520 PI: I. Banerjee. University of Pittsburgh. Role: **A. D'Amore,** (Fibrin gels characterization, porosity analysis).

INCARICHI / CONSULENZE

Reviewer for

- **(2014-present) European Polymer Journal** (1)
- **(2013-present) Journal of Tissue Engineering and Regenerative Medicine** (1)
- **(2012-present) Experimental Techniques** (1)
- **(2011-present) Journal of Biomedical Materials Research: Part A** (2)
- **(2011) Biomedical Engineering Society Conference 2011 Tissue Engineering track** (18)
- **(2010-present) Journal of Biomechanical Engineering** (5)
- **(2009-present) Acta Biomaterialia** (11)

ASSOCIAZIONI SCIENTIFICHE

- **(01/2011) Tissue Engineering and Regenerative Medicine International Society;**
- **(06/2010) American Society of Mechanical Engineers, Bioengineering Division;**
- **(05/2010) Society for Biomaterials;**
- **(01/2010) Material Research Society;**
- **(09/2006) Italian Order of Chartered Engineers.** Admission exam (Esame di Stato di Abilitazione alla Professione di Ingegnere) successfully passed, CEng equivalent.

PUBBLICAZIONE

Publications (JA 17, BC 2, AJ 6, ICP 58, ID 1, **total=84**, from 04/2009 to 07/01/2014, **h=6, cit. 157,)**

- **Journal Articles**

[J. A. 17] J. Carleton, **A. D'Amore**, K. Feaver, G. Rodin, M. Sacks. Geometric characterization and simulation of layered, planar elastomeric fibrous biomaterials. Under review on Acta Biomaterialia, *IF 4.865*.

[J. A. 16] A. Hemmasizadeh, A. Tsamis, R. Cheheltani, S. Assari, **A. D'Amore**, M. Autieri, M. F. Kiani, N. Pleshko, W. R. Wagner, Simon. C. Watkins, D. Vorp. Correlations between Transmural Mechanical and Morphological Properties in Porcine Thoracic Descending Aorta. Under review on Journal of Biomechanics, *IF 3.031*.

[J. A. 15] K. Kim, R. Liang, G. Yang, **A. D'Amore**, A. Pickering. S. Woo. Positive Effects of an ECM Hydrogel on Rat ACL Fibroblast Proliferation and Collagen mRNA Expression. Under review on Knee Surgery, Sports Traumatology, Arthroscopy, *IF 2.67.*

[J. A. 14] **A. D'Amore**, N. Amoroso, R. Gottardi, C. Carruthers, C. Hobson. S. Watkins, W. Wagner, M. Sacks. From single fiber geometry to macro-mechanics: A structural finite-element model for elastomeric fibrous biomaterials. Accepted on Journal of the Mechanical Behavior of Biomedical Materials, *IF 3.12.*

[J. A. 13] D. M. Sánchez-Palencia, **A. D'Amore**, A. Gonzalez, W. R. Wagner and J. C. Briceño. Effects of fabrication on the mechanics, microstructure and micromechanical environment of small intestinal submucosa scaffolds for vascular tissue engineering. In press http://www.sciencedirect.com/science/article/pii/S0021929014002759# on Journal of Biomechanics, *IF 3.031.*

[J. A. 12] K. Task, **A. D'Amore**, S. Singh, M Jaramillo, W. Wagner, P. Kumta, I. Banerjee. Systems Level Approach Reveals the Correlation of Endoderm Differentiation of Mouse Embryonic Stem Cells with Specific Microstructural Cues of Fibrin Gels. In press http://rsif.royalsocietypublishing.org/content/11/95/20140009.short on Journal of the Royal Society Interface, *IF 4.907*.

[J. A. 11] R. Koch, A. Tsamis, **A. D'Amore**, W. Wagner, D. Vorp. A Custom Image-Based Analysis Tool for Quantifying Elastin and Collagen Micro-Architecture in the Wall of the Human Aorta from Multi-Photon Microscopy. In press http://dx.doi.org/10.1016/j.jbiomech.2014.01.027 on Journal of Biomechanics, *IF 3.031*.

[J. A. 10] S. Pal, A. Tsamis, S. Pasta, **A. D'Amore**, T. Gleason, D. Vorp, and S. Maiti. A mechanistic model on the role of "radially-running" collagen fibers on dissection properties of human ascending thoracic aorta. In press http://dx.doi.org/10.1016/j.jbiomech.2014.01.005 on Journal of Biomechanics, *IF 3.031*.

[J. A. 9] D. Faulk, C. Carruthers, H. Warner, C. Kramer, **A. D'Amore**, S. Badylak. The Effect of Decellularization Methods on the Basement Membrane Complex. Acta Biomateralia 2013; (1), 183-193, *IF 4.865*.

[J. A. 8] A. Tsamis, J. Phillippi, R. Koch, S. Pasta, **A. D'Amore**, S. Watkins, W. Wagner, T. Gleason, D. Vorp. Fiber Micro-Architecture in the Longitudinal-Radial and Circumferential-Radial Planes of Ascending Thoracic Aortic Aneurysm Media. Journal of Biomechanics 2013; 46, (16), 2787-2794, *IF 3.031*.

[J. A. 7] K. Takanari, Y. Hong, R. Hashizume, A. Huber, N. Amoroso, **A. D'Amore**, S. Badylak, W. Wagner. Abdominal wall reconstruction by a regionally distinct biocomposite of extracellular matrix digest and a biodegradable elastomer. In press http://onlinelibrary.wiley.com/doi/10.1002/term.1834/full on Journal of Tissue Engineering and Regenerative Medicine 2013, *IF 3.278*.

[J. A. 6] T. Keane, R. Londono, R. Carey, C. Carruthers, **A. D'Amore**, C. Medberry, S. Badylak. Preparation and Characterization of Esophageal Extracellular Matrix. Biomaterials 2013; (34), 6729-6737, *IF 8.415*.

[J. A. 5] M. Wolf, K. Daly, S. Johnson, E. Brennan-Pierce, C. Carruthers, **A. D'Amore**, S. Nagarkar, S. Velankar, S. Badylak. A Hydrogel Derived From Decellularized Dermal Extracellular Matrix. Biomaterials 2012; (33), 7028-7038, *IF 8.415*.

[J. A. 4] N. Amoroso, **A. D'Amore**, Y. Hong, C. Rivera, M. Sacks, W. Wagner. Microstructure Manipulation to Tune Bending Stiffness in Electrospun Scaffolds for Heart Valve Tissue Engineering. Acta Biomaterialia 2012. (8), 4268-4277, *IF 4.865*.

[J. A. 3] N. Amoroso, **A. D'Amore**, Y. Hong, W. Wagner and M. Sacks. Elastomeric Electrospun Polyurethane Scaffolds: The Interrelationship Between Fabrication Conditions, Fiber Topology, and Mechanical Properties. Advanced Materials. 2011; 23, (1),106 –111, *IF 14.829*.

[J. A. 2] **A. D'Amore**, J. Stella, W. Wagner and M. Sacks. Characterization of the Complete Fiber Network Topology of Planar Fibrous Tissues and Scaffolds. Biomaterials 2010; 31:(20) 5345-5354, *IF 8.415*.

[J. A. 1] J. Stella, **A. D'Amore**, W. Wagner and M. Sacks. On the Mechanical function of scaffolds for soft tissue engineering. Acta Biomateralia 2010; 6, (7), 2365-2381, *IF 4.865*.

- **Book chapters**

[B. C. 2] M. Sacks, **A. D'Amore** and C. Hobson. Biomaterials Science: An Introduction to Materials in Medicine, 3rd ed., Chapter I.1.4 "Biomechanics and Finite Element Analysis." Eds. Ratner, Hoffman, Schoen & Lemons. Elsevier Publisher, 2012. ISBN 9780123746269.

[B. C. 1] M. Sacks, S. Wognum, J. Stella, R. Joyce and **A. D'Amore**. Comprehensive Biomaterials, Chapter 94 “The Mechanics of Native and Engineered Cardiac Soft Tissue”. Volume 3, 113-132. Elsevier Publisher, 2011. ISBN: 9780080553023.

- **Abstracts in Journal**

[Ab. J. 6] J. T. Krawiec, K. Bruce, A. Josowitz, L. Kokai, **A. D'Amore**, J. Weinbaum, W. Wagner, P. Rubin, D. Vorp. Evaluating cells from liposuction aspirates for vascular tissue engineering. Angiogenesis 2014/1/1, 17 (1), 306-306, *IF 3.97.*

[Ab. J. 5] A. Tsamis, J.A. Phillippi, S. Pasta, A. D'Amore, S. Watkins, W. Wagner, D. Vorp, T. Gleason. Collagen fiber architecture in the longitudinal-radial plane of ascending aorta is distinctly different amongbicuspid aortic valve and tricuspid aortic valve patients with ascending aortic aneurysm. Cardiovascular Pathology 2013, Volume 22, Issue 3 , e34-e35, *IF 2.352*.

[Ab. J. 4] M. Wolf, K. Daly, E. Brennan-Pierce, S. Johnson, C. Carruthers, **A. D'Amore**, S. Nagarkar, S. Velankar, S. Badylak. Extracellular Matrix Hydrogels Prepared from Porcine Dermis and Urinary Bladder: Structure, Mechanics and In Vivo Remodeling. Glycobiology 2012, 22 (11), p. 1585, *IF 3.53.*

[Ab. J. 3] A. S Bayoumi, **A. D'Amore**, E. Aikawa, N. Amoroso, S. E New, A. Cubberley, P. Chen, K. Shapero, R.F Padera, F. J Schoen, W. R Wagner, M. S Sacks, J. E Mayer. Unseeded Engineered Valve Leaflets Retain Function and Remodel After Implant in Sheep Right Pulmonary Outflow Tract. Circulation, 2012 Vol. 126, (21): A19201 *IF 15.202*.

[Ab. J. 2] A. D’Amore, J. Stella, R. Hoff, N. Amoroso, M. Sacks, W. Wagner Controlling micro-structure to enhance de novo extracellular matrix deposition in elastomeric scaffolds for cardiac tissue regeneration. 3rd TERMIS World Congress in Vienna September 5th – 8th 2012. published on Journal of Tissue Engineering and Regenerative Medicine, Vol 6,110, *IF 3.278*.

[Ab. J. 1] S. Pasta, J. Phillippi, A. D’Amore, W. Wagner, S. Watkins, T. Gleason and D. Vorp. Fiber distribution of ascending thoracic aortic aneurysms associated with valve morphology. Proceedings of European Society for Biomechanics (ESB) 2012 July 1st - 4th. Lisbon, Portugal, published on Journal of Biomechanics, Vol. 45.Supplement 1, S124, *IF 3.031.*

- **International Conferences Proceedings**

  (podium or poster personally presented are underlined for a total of = 13= 7 podium + 6 poster presentations)

  Podium

  [C. P. 58] A. Tsamis, S. Pal, J. A. Phillippi, S. Pasta, **A. D'Amore**, T. G. Gleason, D. A. Vorp , S. Maiti. Role of Aneurysm on Biomechanics of Radially-Oriented Fibers in Human Ascending Thoracic Aorta Biomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014 in San Antonio, Texas.

  [C. P. 56] A. Tsamis, S. Pal, J. Phillippi, S. Pasta, **A. D'Amore**, T. Gleason, D. Vorp, S. Maiti. Role of Aneurysm on Biomechanics of Radially-Oriented Fibers in Human Ascending Thoracic AortaBiomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014 in San Antonio, Texas.

  [C. P. 55] A. Bayoumi, **A. D'Amore**, A. Cubberley, N. Amoroso, P. Chen, R. Lin, K. Shapero, D. Brown, E. Aikawa, R. Padera, F. Schoen, W. Wagner, M. Sacks, J. Mayer, Jr. Heart Valve Engineering: Unseeded Elastomeric Single Leaflets Retain Function and Remodel After Implant In Ovine Pulmonary Outflow Tract 7th Biennial Meeting on Heart Valve Biology and Tissue Engineering (SHVD2013), 22nd – 25th June, 2013, Venice, Italy.

  [C. P. 54] K. Task, **A. D'Amore**, S. Singh, M. Jaramillo, W. Wagner, P. Kumta, I. Banerjee. Specific Microstructural Cues Correlate with Endoderm Differentiation of Mouse Embryonic Stem Cells on Fibrin Gels as Revealed by a Systems Level Approach. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2013), 25th -28th October 2013 Seattle, Washington.

  [C. P. 53] S. Pal, A. Tsamis, S. Pasta, **A. D'Amore**, T. Gleason, D. Vorp, S. Maiti. Mechanistic Model on Role of "Radially-Running" Collagen in Dissection Properties of Ascending Aorta. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2013), 25th -28th October 2013 Seattle, Washington.

[C. P. 52] A. Tsamis, J. Phillippi, R. Koch, J. Krawiec, **A. D'Amore**, S. Watkins, W. Wagner, D. A. Vorp, T. Gleason. Aortic Valve Morphology Dictates Spatial Differences in Ascending Aortic Aneurysm Fiber Architecture. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2013), 25th -28th October 2013 Seattle, Washington.

[C. P. 51] J. Carleton, **A. DAmore**, G. Rodin, M. Sacks A process for creating scaffold fiber network using random walks.. Proceedings of 11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE2013), 3rd - 6th April 2013, Salt Lake city, Utah.

[C. P. 50] J. Carleton, **A. DAmore**, G. Rodin, M. Sacks. A Computational Model for the Geometric and Mechanical Characterization of Electrospun Scaffolds. Proceedings of the NanoEngineering for Medicine and Biology (NEMB 2013) February 4th -6th , Boston, MA, USA.

[C. P. 49] A. Tsamis, J. Philippi, R. Koch, J. Krawiec**, A. D'Amore**, S. Watkins, W. Wagner, D. Vorp, T. Gleason. Region-specific fiber micro-architecture in the longitudinal-radial and circumferential-radial planes among bicuspid and tricuspid aortic valve aneurysm of human ascending thoracic aorta. Proceedings of the European Society for Biomechanics (ESB 2013) August 23rd -25th , Patras Greece.

[C. P. 48] R. Koch, A. Tsamis, **A. D'Amore**, S. Watkins, W. Wagner, D. Vorp. A custom image-based analysis tool for quantifying elastin and collagen fiber micro-architecture in the wall of the human aorta from multi-photon microscopy images. Proceedings of the ASME 2013 Summer Bioengineering Conference (SBC2013), June 26th -29th , Sunriver, Oregon, USA.

[C. P. 47] A. Tsamis, J. Philippi, R. Koch, J. Krawiec, **A. D'Amore**, S. Watkins, W. Wagner, D. A. Vorp, T. Gleason. Region-specific fiber micro-architecture in the longitudinal-radial and circumferential-radial planes among bicuspid and tricuspid aortic valve aneurysm of human ascending thoracic aorta. Proceedings of the ASME 2013 Summer Bioengineering Conference (SBC2013), June 26th -29th , Sunriver, Oregon, USA.

(Missing in CV but present in MIUR) Koch R, Tsamis A, D'Amore A, Wagner W, Vorp D. (2012). Custom image analysis tool for quantifying aortic wall architecture from multiphoton microscopy. . In: Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2012), 24th -27th October 2012 Atlanta, GA;. September

[C. P. 46] A. Tsamis, S. Pasta, **A. D'Amore**, J. Phillippi, T. Gleason, W. Wagner, and D. Vorp. Fiber Architecture in the Long-Radial Plane in the Wall of Dissected Human Ascending Thoracic Aorta. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2012), 24th -27th October 2012 Atlanta, GA;

[C. P. 45] A. Tsamis, J. Phillippi, S. Pasta, **A. D'Amore**, S. Watkins, W. Wagner, D. Vorp, T. Gleason. Collagen and Elastin Fiber Architecture in the Longitudinal-Radial Plane of Human Ascending Thoracic Aortic Media in Health and Aneurysm. The International Society for Applied Cardiovascular Biology (ISACB) 13th biennial meeting 12th -15th September 2012, London UK;

[C. P. 44] K. Task, **A. D'Amore**, S. Singh, M. Jaramillo, P. Kumta and I. Banerjee. Correlating Effects of Gel Microstructural Features with Specific Differentiation Patterning of Mouse Embryonic Stem Cells, Proceedings of AIChE's Annual Meeting October 28th November 2nd , 2012 Pittsburgh USA;

[C. P. 43] D. Sanchez, **A. D'Amore**, W. Wagner, and J. Brice. Scaffold Structure and Mechanics in Differently Obtained Small Intestinal Submucosa Scaffolds. 58th Annual Conference American Society Artificial Internal Organs (ASAIO) 2012, June 13th - 16th , San Francisco.

[C. P. 42] **A. D'Amore**, A. Bayoumi, N. Amoroso, W. Wagner, J. Mayer, M. Sacks. Computational structural biomechanical models to guide tissue engineered heart valve leaflet fabrication 5th Biennial Meeting on Heart Valve Biology and Tissue Engineering 2012, (SHVD 2012)18th – 20th May, Myconos, Greece.

[C. P. 41] J. Stella, N. Amoroso, **A. D'Amore**, J. Mayer, Jr., W. Wagner, M. Sacks Effects of finite deformation on extracellular matrix production and mechanical properties 5th Biennial Meeting on Heart Valve Biology and Tissue Engineering 2012, (SHVD 2012)18th – 20th May, Myconos, Greece.

[C. P. 40] **A. D'Amore**, W. Wagner, M. Sacks. Computational structural biomechanical models of elastomeric tissue engineered scaffolds. 10th World Congress on Computational Mechanics (WCCM 2012) 8th -13rd July, São Paulo, Brazil,.

[C. P. 39] K. Task, **A. D'Amore**, S. Singh, M. Jaramillo, P. Kumta, I. Banerjee. "Correlating Effects of Gel Microstructural Features with Specific Differentiation Patterning of Embryonic Stem Cells." For Future Presentation at the International Society for Stem Cell Research Annual Meeting, 2012. Yokohama, Japan.

[C. P. 38] C. Carruthers, B. Good, **A. D'Amore**, J. Liao, R. Amini, S. Watkins, M. Sacks. Alterations in the microstructure of the anterior mitral valve leaflet under physiological stress. ASME 2012 Summer Bioengineering Conference (SBC2012), June 22th – 23rd, Fajardo, Puerto Rico, USA.

[C. P. 37] N. Amoroso, **A. D'Amore**, M. Sacks and W. Wagner. Tailoring Flexural and In-Plane Mechanics of Electrospun

Polyurethanes toward Heart Valve Applications. Proceedings of TERMIS 2011 December 11th -14th, Houston TX USA.

[C. P. 36] K. Task, **A. D'Amore**, S. Singh, M. Jaramillo, P. Kumta and I. Banerjee. Correlating Effect of Gel Microstructural Features with Specific Differentiation Patterning of Embryonic Stem Cells. Proceedings of AIChE's Annual Meeting 2011 October 16th-21th, Minneapolis USA.

[C. P. 35] A. Cloonan, **A. D'Amore**, E. DeBarra, W. Wagner, M. Sacks, T. McGloughlin. Nano-Structured Electrospun Membranes: Cellular Responses in an in vitro Model. Proceedings of the 24th European Conference on Biomaterials (ESB2011) September 4th – 9th, Dublin, Ireland.

[C. P. 34] **A. D'Amore**, C. Hobson, J. Stella, N. Amoroso, W. Wagner, M. Sacks. Structural Deterministic Biomechanical Models of Elastomeric Scaffolds for Soft Tissue Regeneration. Proceedings of the 11th National Congress on Computational Mechanics 2011 July 25th -29th , Minneapolis USA.

[C. P. 33] **A. D'Amore**, C. Hobson, J. Stella, N. Amoroso, W. Wagner, M. Sacks. Structural Deterministic Biomechanical Models of Elastomeric Scaffolds for Soft Tissue Regeneration. Proceedings of Southern Biomedical Engineering Conference 2011 April 29th -May 1st , University of Texas at Arlington, USA.

[C. P. 32] C. Carruthers, B. Good, **A. D'Amore**, R. Amini, T. Shuto, R. Gorman, J. Gorman, M. Sacks. Physiological Micromechanics of the Mitral Valve Anterior Leaflet. Proceedings of the 6th Society for Heart Valve Disease Conference 2011 (SHVD2011) June 25th -26th , Barcelona Spain.

[C. P. 31] C. Carruthers, B. Good, **A. D'Amore**, R. Amini, J. Gorman, M. Sacks. Physiological Micromechanics of the Anterior Mitral Leaflet. Proceedings of the ASME 2011 Summer Bioengineering Conference (SBC2011) June 22nd -25th , Nemacolin Woodlands Resort, Famington, Pennsylvania, USA.

[C. P. 30] M. Sacks C. Eckert and **A. D'Amore**. Advanced Constitutive Models for Native and Engineered Valvular Tissues. Symposium on Computer Models in Biomechanics from Nano to Macro, (UTAM 2011), August 29th -September 22nd. Stanford CA.

[C. P. 29] **A. D'Amore**, G. Petrucci, W. Wagner and M. Sacks. A novel approach to fully characterize fiber network morphology of planar tissues and scaffolds. AIAS, Associazione Italiana per Analisi delle Sollecitazioni, 40th Convegno Nazionale, September 7th-10 2011, Palermo Italy.

[C. P. 28] **A. D'Amore**. Micro – Meso scale based biomechanical models to assist the design and fabrication of scaffolds for Cardiac Tissue Regeneration. AIAS, Associazione Italiana per Analisi delle Sollecitazioni, 40th Convegno Nazionale, September 7th -10th 2011, Palermo Italy, extended abstract.

[C. P. 27] **A. D'Amore**, J. Stella, W. Wagner and M. Sacks. A Method to Extract the Complete Fiber Network Topology of Planar Fibrous Tissues and Scaffolds. Proceedings of the ASME 2010 Summer Bioengineering Conference (SBC2010) June 16th -19th , Grande Beach Resort, Naples Florida, USA.

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Poster

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[C. P. 20] J. Krawiec, K. Bruce, A. Josowitz, L. Kokai, **A. D'Amore**, J. Weinbaum, W. Wagner, P. Rubin, D. Vorp, "Evaluating Cells from Liposuction Aspirates for Vascular Tissue Engineering," North American Vascular Biology Organization - Vascular Biology 2013, Cape cod MA, October 2013.

[C. P. 19] A. Tsamis, J. Phillippi, R. Koch, J. Krawiec, **A. D'Amore**, S. Watkins,W. Wagner,D. Vorp, T. Gleason. "Aortic valve morphology dictates region-specific fiber architecture in human ascending thoracic aortic aneurysms," McGowan Institute for Regenerative Medicine Annual Retreat, Farmington, PA, March 2013.

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[C. P. 17] D. Park, C. Yap, D. Dutta, **A. D'Amore**, T. Yoshizumi, W. Wagner, K. Kim. Non-invasive Assessment of Mechanical Properties of Heart with a Cardiac Patch by 3D Ultrasound Elasticity Imaging McGowan Institute for Regenerative Medicine Retreat March 7th -9th , 2013 Nemacolin, PA, USA.

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[C. P. 15] A. Bayoumi, **A. D'Amore**, E. Aikawa, N. Amoroso, S. New, A. Cubberley, P. Chen, K. Shapero, R. Padera, Jr., F. Schoen, W. Wagner, M. Sacks, J. Mayer, Jr. Unseeded engineered valve leaflets retain function and remodel after implant in ovine pulmonary outflow tract. American Heart Association Annual meeting (AHA2012), 3rd -7th of November 2012, Los Angeles CA.

[C. P. 14] **A. D'Amore**, C. Hobson, J. Stella, N. Amoroso, W. R. Wagner, M. S. Sacks. Structural Biomechanical Models to guide the fabrication of Scaffolds for Cardiac Tissue Engineering. 16th Annual Workshop, Regenerative Medicine: Harnessing Biology for Regenerative Medicine, 2012, March 14th -17th , Hilton Head, South Carolina, USA.

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[C. P. 12] N. Amoroso, **A. D'Amore**, W. Wagner and M. Sacks. Tuning Bending Stiffness in Elastomeric Electrospun Scaffolds for Heart Valve Tissue Engineering. Proceedings of the Society for Biomaterials annual meeting April 13th -16th , 2011 Orlando, Florida, USA.

[C. P. 11] **A. D'Amore**, C. Hobson, J. Stella,N. Amoroso, W. Wagner, M. Sacks. Micro - Meso Scale Based Biomechanical Models to Assist the Design and Fabrication of Scaffolds for Cardiac Tissue Regeneration. McGowan Institute for Regenerative Medicine Retreat March 6th -8th , 2011 Nemacolin, PA, USA Award winner as the best 2011 modeling work.

[C. P. 10] C. Carruthers, B. Good, **A. D'Amore**, R. Amini, J. Gorman, M. Sacks. Physiological Micromechanics of the Anterior Mitral Valve Leaflet. McGowan Institute for Regenerative Medicine Retreat March 6th -8th , 2011 Nemacolin, PA, USA.

[C. P. 9] S. Pasta, J. Phillippi, **A. D'Amore**, M. Sacks, S. Watkins, T. Gleason, and D. Vorp. Association of Fiber Orientation and Dissection Properties of Ascending Thoracic Aortic Aneurysms with Aortic Valve Morphology. Proceedings of the ASME 2011 Summer Bioengineering Conference (SBC2011) June 22th -25th , Nemacolin Woodlands Resort, Famington, Pennsylvania, USA.

[C. P. 8] **A. D'Amore**, C. Hobson, W. Wagner and M. Sacks. A microstructure based mechanical model for planar fibrous scaffolds. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2010) October 6th –9th , 2010 Austin Convention Center, Austin, Texas.

[C. P. 7] N. Amoroso, **A. D'Amore**, W. Wagner M. Sacks. Tailoring Electrospinning Fabrication for Scaffolds for Heart Valve Tissue Engineering. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2010) October 6th – 9th 2010, Austin Convention Center, Austin, Texas.

[C. P. 6] **A. D'Amore**, N. Amoroso, W. Wagner and M. Sacks. Effects of Rastering Velocity on Electrospun Polyurethane Structure and Mechanical Properties. Proceedings of the Society for Biomaterials annual meeting April 21th -24th , 2010 Seattle, WA, USA.

[C. P. 5] **A. D'Amore**, J. Stella,W. Wagner and M. Sacks. A novel approach to fully characterize fiber network morphology of planar fibrous tissues and scaffolds. McGowan Institute for Regenerative Medicine Retreat March 7th -10th 2010 Nemacolin, PA, USA.

[C. P. 4] C. Hobson, S. Boronyak, **A. D'Amore**, J. Mayer Jr. and M. Sacks. Effect of Physiologic Oscillatory Fluid Shear Stress on Engineered Heart Valve Tissue Formation. McGowan Institute for Regenerative Medicine Retreat March 7th -10th 2010 Nemacolin, PA, USA.

[C. P. 3] **A. D'Amore**, J. Stella, D. Schimdt, W. Wagner and M. Sacks. A Structural Deterministic Model for Electrospun Scaffolds. Material Research Society Fall Meeting (MRS2009) November 30th – December 4th 2009, Boston MA, USA.

[C. P. 2] **A. D'Amore**, J. Stella, D. Schimdt, W. Wagner and M. Sacks. Analysis of Electrospun Scaffolds Micro - Architectural Data. Proceedings of the Biomedical Engineering Society Annual Meeting (BMES2009) October 7th -10th 2009 Pittsburgh PA, USA.

[C. P. 1] **A. D'Amore**, J. Stella, D. Schimdt, W. Wagner and M. Sacks. Micro Scale Based Mechanical Models for Electrospun Poly (Ester Urethane) Urea Scaffolds. McGowan Institute for Regenerative Medicine Retreat March 8th -11th 2009 Nemacolin, PA, USA.

ATTIVITA' SCIENTIFICHE

Antonio research activity focuses on the development of novel tissue engineering paradigms and biomaterials for cardiovascular tissue regeneration. Key steps involved in this process are:

- Develop and experimentally validate structural modeling strategies to: guide tissue engineering scaffold fabrication and provide a deeper understanding of cellular mechanics and metabolic response to local micro-structural deformations;
- Utilize elastomeric, cell-seeded, and/or extracellular matrix (ECM) derived scaffolds on stretch bioreactors to assess in vitro the impact of strain and scaffold micro-structure on de novo ECM deposition;
- Assess the in vivo performance of fabricated scaffolds on 1) dilated rodent/pigs hearts following myocardial infarction; 2) rat/pigs abdominal partial wall defect repair.

Antonio developed innovative methods to fully characterize native tissues and scaffolds micro-structure. His approach has been successfully utilized by several laboratories on a large variety of biomaterials including: fibrin gels, polyurethane scaffolds, decellularized tissue, urinary bladder matrix (UBM), small intestine submucosa (SIS), aortic aneurism tissue, native heart valve, non woven blends. Leveraging this expertise he defined and experimentally validated a biomechanical model to correlate scaffold and native tissues structure with their mechanical behavior across the scales. This footstep involved maturating knowledge of a large skill set including: electrospinning, thermo induce phase separation, salt leaching, double emulsion fabrication process, scanning electron microscopy and multi photon imaging, biaxial testing , finite element simulation, bioreactors and cell culture. With the desire to fill the gap between the material design and the actual performance

in vivo he is trying to expand his expertise leading and coordinating several animal studies. The scaffolds he fabricated have been implanted and tested on a variety of in vivo scenarios including: (I) tissue engineered pulmonary valve leaflet, ovine model; (II) myocardial patch, rat/pig infarction model; (III) abdominal wall repair, rat/pig abdominal wall defect model; (IV) tissue engineered vascular graft, rat abdominal aorta. A mechanistic understanding of how the material micro structure translates into a specific mechanical response would lead to a better performing generation of tissue engineered constructs.

AMBITI DI RICERCA

**********CERCASI TESISTI ! **********

ATTIVITA' SPERIMENTALE

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RESEARCH TOPICS

Cardiovascular Tissue Engineering

Biomaterials design and fabrication

Biomechanics

Advanced materials and native tissue structure function characterization

In vivo pre-clinical studies