

Exhibit 1

CURRICULUM VITAE

Emanuel Frank Petricoin III, Ph.D.,

Co-Director, Center for Applied Proteomics and Molecular Medicine
Professor of Life Sciences
College of Sciences
George Mason University

Date and Place of Birth: August 22, 1964; Plainfield, New Jersey

Marital Status: Married; two children
Wife: Becky
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Sophia, Age 6

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Education:

- Ph.D. 1990 Microbiology, University of Maryland at College Park
- B.S. 1985 Microbiology, University of Maryland at College Park

Recent Employment Summary:

- 2005- present Professor, College of Sciences, George Mason University
- 2005-present Co-Director, Center for Applied Proteomics and Molecular Medicine, George Mason University
- 2006-2007 Chair, Department of Molecular and Microbiology, George Mason University
- 2003 - 2005 Senior Investigator, Office of Cell, Tissue and Gene

Therapy, CBER/FDA

- 2001 - 2005 Co-Director FDA-NCI Clinical Proteomics Program
- 1999 - 2003 Senior Investigator, Division of Therapeutic Products, CBER/FDA
- 1999 - 2001 Co-Director FDA-NCI Tissue Proteomics Initiative
- 1995 - 1999 Senior Staff Fellow, Division of Cytokine Biology, CBER/FDA
- 1993 - 1995 Staff Fellow, Division of Cytokine Biology, CBER/FDA
- 1990 - 1993 National Research Council Post-Doctoral Fellow, CBER/FDA

Honors/Awards:

- U of Louisville, Kentucky Colonel Award 2006
- Faculty of 1000 in Medicine 2005,2006,2007
- Harvard University and Children's Hospital- Leading Edge Award, 2004
- Nancy Terner Berman Award and Lecture, 2004
- American Society of Cytopathology Basic Research Award, 2003
- Clinical Ligand Assay Society- Distinguished Scientist Award, 2003
- NIH Director's Award, 2002
- University of North Carolina, School of Medicine- Ralph Landes Award, 2002
- FDA Scientific Merit Award For Outstanding Intercenter Collaboration, 2001
- CBER Director's Distinguished Service Award, 2001
- National Research Council Fellowship Award, 1990

Research Interests:

- Personalized and tailored medicine enabled through the use of cutting-edge microproteomic technologies
- Translational applications for molecular network and signal pathway profiling technologies in human tissue
- Identification and discovery of body fluid and tissue-based biomarkers for early stage disease detection
- Identification and discovery of biomarkers for early stage drug, biological, and nano toxicity through the use of novel proteomic formats
- Development of nanotechnology tools for increased analytical detection, drug delivery, imaging and monitoring
- Development of mathematical and bioinformatics approaches for molecular network elucidation and protein-protein interaction analysis

- Development of high-throughput multiplexed proteomic sensing technologies and microfabricated biosensors.

Publications:

1. Havaleshko DM, Smith SC, Cho H, Cheon S, Owens CR, Lee JK, Liotta LA, Espina V, Wulfkuhle JD, Petricoin EF, Theodorescu D. Comparison of global versus epidermal growth factor receptor pathway profiling for prediction of lapatinib sensitivity in bladder cancer. **Neoplasia**. 2009 Nov;11(11):1185-93.
2. Wei BH, Hoover SB, Ross MR, Zhou W, Meani F, Edwards JB, Spehalski EI, Risinger JI, Alvord WG, Quiñones OA, Belluco C, Martella, Campagnutta E, Ravaggi A, Dai RM, Goldsmith PK, Woolard KD, Pecorelli S, Liotta LA, Petricoin EF, Simpson RM. S100A6 Concentration Predicts Peritoneal Tumor Burden in Mice with Epithelial Ovarian Cancer and Is Associated with Advanced Stage in Patients. **PloS One**. 2009 Oct 30;4(10):e7670.
3. Anderson T, Wulfkuhle J, Liotta L, Winslow RL, Petricoin E 3rd. Improved reproducibility of reverse phase protein microarrays using array microenvironment normalization **Proteomics**. 2009 Oct 15. [Epub ahead of print]
4. Zhou W, Ross M, Tessitore A, Ornstein D, Vanmeter A, Liotta LA, Petricoin EF. An initial characterization of the serum phosphoproteome. **J Proteome Res** 2009. Oct 14. E pub ahead of print
5. Narayanan A, Zhou W, Ross R, Tang J, Liotta L, Petricoin E, Kashanchi F, Bailey C, Popov S. Discovery of Infectious Disease Biomarkers in Murine Anthrax Model Using Mass Spectrometry of the Low-Molecular-Mass Serum Proteome, 2009 **J Proteomic Bioinform**. 2(9):408-415.
6. Meani F, Pecorelli S, Liotta L, Petricoin EF. Clinical application of proteomics in ovarian cancer prevention and treatment. **Mol Diagn Ther**. 2009;13(5):297-311.
7. Finley DS, Calvert VS, Inokuchi J, Lau A, Narula N, Petricoin EF, Zaldivar F, Santos R, Tyson DR, Ornstein DK. Periprostatic Adipose Tissue as a Modulator of Prostate Cancer Aggressiveness. **J Urol**. 2009 Oct;182(4):1621-7.
8. Tahara H, Sato M, Thurin M, Wang E, Butterfield LH, Disis ML, Fox BA, Lee PP, Khleif SN, Wigginton JM, Ambs S, Akutsu Y, Chaussabel D, Doki Y, Eremin O, Fridman WH, Hirohashi Y, Imai K, Jacobson J, Jinushi M, Kanamoto A, Kashani-Sabet M, Kato K, Kawakami Y, Kirkwood JM, Kleen TO, Lehmann PV, Liotta L, Lotze MT, Maio M, Malyguine A, Masucci G, Matsubara H, Mayrand-Chung S, Nakamura K, Nishikawa H, Palucka AK, Petricoin EF, Pos Z, Ribas A, Rivoltini L, Sato N, Shiku H, Slingsluff CA, Streicher H, Stroncek DF, Takeuchi H, Toyota M, Wada H, Wu X, Wulfkuhle J, Yaguchi T, Zeskind B, Zhao Y, Zocca MB, Marincola FM. Emerging concepts in biomarker discovery; The US-Japan workshop on immunological molecular markers in oncology. **J Transl Med**. 2009 Jun 17;7(1):45.
9. Diamandis EP, Hanash S, Lopez M, Carr S, Petricoin EF 3rd Protein quantification by mass spectrometry: is it ready for prime time? **Clin Chem**. 2009 Jul;55(7):1427-30.

10. Davuluri G, Espina V, Petricoin EF 3rd, Ross M, Deng J, Liotta LA, Glaser BM. Activated VEGF Receptor Shed Into the Vitreous in Eyes With Wet AMD: A New Class of Biomarkers in the Vitreous With Potential for Predicting the Treatment Timing and Monitoring Response. **Arch Ophthalmol.** **2009** May;127(5):613-21.
11. Pierobon M, Calvert V, Belluco C, Garaci E, Deng J, Lise M, Nitti D, Mammano E, Marchi FD, Liotta L, Petricoin E. Multiplexed Cell Signaling Analysis of Metastatic and Nonmetastatic Colorectal Cancer Reveals COX2-EGFR Signaling Activation as a Potential Prognostic Pathway Biomarker. **Clin Colorectal Cancer.** **2009** Apr;8(2):110-7.
12. Popova T, Espina VE, Bailey C, Liotta L, Petricoin E, Popov S. Anthrax infection inhibits the AKT signaling involved in the E-cadherin-mediated adhesion of lung epithelial cells **FEMS Immunol Med Microbiol.** **2009** April E pub ahead of print
13. Gulmann C, Sheehan KM, Conroy RM, Wulfkühle JD, Espina V, Mullarkey MJ, Kay EW, Liotta LA, Petricoin EF. Quantitative cell signaling analysis reveals down-regulation of MAPK pathway activation in colorectal cancer. **J Pathol.** **2009** Mar 20.
14. Petricoin EF. Proteomics in laboratory medicine. Preface. **Clin Lab Med.** **2009** Mar;29(1):xiii-xiv.
15. Espina V, Liotta LA, Petricoin EF. Reverse-phase protein microarrays for theranostics and patient tailored therapy. **Methods Mol Biol.** **2009**;520:89-105.
16. Grubb R, Deng J, Pinto P, Mohler J, Chinnaiyan A, Rubin M, Linehan W, Liotta L, Petricoin EF, Wulfkühle J. Pathway Biomarker Profiling of Localized and Metastatic Human Prostate Cancer Reveal Metastatic and Prognostic Signatures. **J Proteome Res.** **2009** Mar 10. [Epub ahead of print]
17. Longo C, Patanarut A, George T, Bishop B, Zhou W, Fredolini C, Ross MM, Espina V, Pellacani G, Petricoin EF 3rd, Liotta LA, Luchini A. Core-shell hydrogel particles harvest, concentrate and preserve labile low abundance biomarkers. **PLoS ONE.** **2009**;4(3):e4763.
18. Nijdam AJ, Zianni MR, Herderick EE, Cheng MM, Prospero JR, Robertson FA, Petricoin EF, Liotta LA, Ferrari M Application of Physicochemically Modified Silicon Substrates as Reverse-Phase Protein Microarrays. **J Proteome Res.** **2009** Jan 26
19. Fredolini C, Meani F, Reeder, KA, Rucker S, Paanarut, A, Botterell PJ, Bishop B, Longo C, Espina V, Petricoin EF, Liotta LA, Luchini A. Concentration and Preservation of Very Low Abundance Biomarkers in Urine, such as Human Growth Hormone (hGH), by Cibacron Blue F3G-A Loaded Hydrogel Particles. **Nano Res,** **2008** 1:502-518
20. Napoletani D, Sauer T, Struppa DC, Petricoin E, Liotta L. Augmented sparse reconstruction of protein signaling networks. **J Theor Biol.** **2008** Nov 7;255(1):40-52
21. Vanmeter AJ, Rodriguez AS, Bowman ED, Harris CC, Deng J, Calvert VS, Silvestri A, Fredolini C, Chandhoke V, Petricoin EF 3rd, Liotta LA, Espina V. LCM and protein microarray analysis of human NSCLC: Differential EGFR phosphorylation events associated with mutated EGFR compared to wild type. **Mol Cell Proteomics.** **2008** Oct;7(10):1902-24.

22. Espina VA, Edmiston KH, Heiby M, Pierobon M, Sciro M, Merritt B, Banks S, Deng J, Vanmeter AJ, Geho DH, Pastore L, Sennesh J, Petricoin EF 3rd, Liotta LA. A portrait of tissue phosphoprotein stability in the clinical tissue procurement process. **Mol Cell Proteomics**. 2008 Oct;7(10):1998-2018.
23. Sturgeon CM, Hoffman BR, Chan DW, Ch'ng SL, Hammond E, Hayes DF, Liotta LA, Petricoin EF, Schmitt M, Semmes OJ, Söletormos G, van der Merwe E, Diamandis EP; National Academy of Clinical Biochemistry. National Academy of Clinical Biochemistry Laboratory Medicine Practice Guidelines for Use of Tumor Markers in Clinical Practice: Quality Requirements. **Clin Chem**. 2008 Aug;54(8):e1-e10.
24. Speer R, Wulfkuhle J, Espina V, Aurajo R, Edmiston KH, Liotta LA, Petricoin EF 3rd. Molecular network analysis using reverse phase protein microarrays for patient tailored therapy. **Adv Exp Med Biol**. 2008;610:177-86.
25. Liotta L, Petricoin E. Nanomedicine--the power of proteins: a conversation with Lance Liotta and Emanuel Petricoin. Interview by Barbara J Culliton. **Health Aff**. 2008 Jul-Aug;27(4):w310-4.
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31. Luchini A, Geho DH, Bishop B, Tran D, Xia C, Dufour RL, Jones CD, Espina V, Patanarut A, Zhou W, Ross MM, Tessitore A, Petricoin EF, Liotta LA. Smart Hydrogel Particles: Biomarker Harvesting: One-Step Affinity Purification, Size Exclusion, and Protection against Degradation. **Nano Lett.** 2008 Jan;8(1):350-61.
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33. Sanchez-Carbayo M, Socci ND, Richstone L, Corton M, Behrendt N, Wulfkuhle J, Bochner B, Petricoin E, Cordon-Cardo C. Genomic and Proteomic Profiles Reveal the Association of Gelsolin to TP53 Status and Bladder Cancer Progression. **Am J Pathol.** 2007 Nov;171(5):1650-1658.
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37. VanMeter A, Signore M, Pierobon M, Espina V, Liotta LA, Petricoin EF Reverse-phase protein microarrays: application to biomarker discovery and translational medicine **Expert Review of Molecular Diagnostics.** 2007. 7(5): 625-633(9)
38. Speer R, Wulfkuhle J, Espina V, Aurajo R, Edmiston KH, Liotta LA, Petricoin EF 3rd. Development of reverse phase protein microarrays for clinical applications and patient-tailored therapy. **Cancer Genomics Proteomics.** 2007 May-Jun;4(3):157-64.
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41. Belluco C, Petricoin E, Peschle C, Liu C, Lowenthal M, Johann D, Lasebikan L, Ross-Rucker, S, Lise, M, Di Maggio C, Mammano E, Facchiano F, Nitti D, Garaci E, Mills G, Liotta L, Whiteley G. Serum proteomic mass spectrometry a highly sensitive and specific discriminatory pattern for Stage I breast cancer. **Annal. of Surgical Oncology**. **2007** epub ahead of print Jun 27
42. Araujo RP, Petricoin EF, Lotta LA.: Mathematical modeling of the cancer cell's control circuitry: Paving the way to patient-tailored combination therapy. **Current Signal Transduction Therapies**, **2007**. 2(2):145-55.
43. Geho DH, Luchini A, Garaci E, Belluco C, Petricoin E, Liotta LA. Nanotechnology in clinical proteomics. **Nanomed**. **2007** Feb;2(1):1-5
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45. Rapkiewicz A, Espina V, Zujewski JA, Lebowitz PF, Filie A, Wulfkuhle J, Camphausen K, Petricoin EF 3rd, Liotta LA, Abati A. The needle in the haystack: Application of breast fine-needle aspirate samples to quantitative protein microarray technology. **Cancer Cytology**. **2007** Jun 25;111(3):173-84.
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factor receptor signaling after stimulation by EGF using extended range proteomic analysis (ERPA). **Mol Cell Proteomics**. 2006 Jun 23; [Epub ahead of print]

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Grant Review Committees:

- 2009 NCI Cancer Biomarkers Panel Ad Hoc Reviewer
- 2009 NIAAA P30 and RC2 Grant Review
- 2009 NCI RC1 and RC2 Grant Review
- 2009: Department of Defense BCRP Panel Review
- 2008-2011: Susan B. Komen Clinical Diagnostic and Prognostic Biomarkers Review Committee
- 2008: NHGRI Systems Biology Review Committee
- 2008 Susan B. Komen for the Cure
- 2008: Department of Defense/TATRC Review Committee
- 2007: NIAID Systems Biology Review Committee
- 2004: ad hoc reviewer for Department of Defense Ovarian Cancer Research Program Review

Board/Advisory Board/Other Outside Committee Memberships:

- **2009:** ImClone Systems, Inc., Strategic Scientific Council Member
- **2008-present:** Ceres Nanosciences, Scientific Advisory Board
- **2007-present:** SuperArray, Inc: Scientific Advisory Board
- **2006-present:** Theranostics Health, LLC: Founder, Acting CSO, Scientific Advisory Board
- **2006-present:** NICHD Genomics and Proteomics Advisory Board
- **2006-present:** IBC Scientific Advisory Board
- **2005-present:** Cambridge Healthtech Scientific Advisory Board
- **2005-present:** NIDDK Mechanistic Technologies Advisory Panel
- **2004-present:** Scientific Advisory Board: Duke University Cancer Center
- **2002 - 2004:** NHGRI Clinical Proteomics Scientific Advisory Board
- **2002 - 2004:** Human Proteome Organization Executive Committee and Treasurer
- **2001 - 2005:** NCI Proteomics Executive Committee

- **2003:** Scientific Advisory Board: Emory University
- **2003:** Scientific Advisory Board: Vanderbilt University
- **2001 - 2004:** External Scientific Advisory Board: University of Hawaii Research Centers in Minority Institutions Program
- **2001:** External Scientific Advisory Board: University of Minnesota's Biomedical Genomics Center

Editorial Appointments:

- **2008-present:** Senior Editor, *Cancer Epidemiology Biomarkers and Prevention*
- **2006-present:** Editor, *Expert Opinion in Molecular Diagnostics*
- **2006-present:** Editor, *Pharmacogenomics*
- **2006-present:** Associate Editor: *Proteomics: Clinical Applications*
- **2006-present:** Editor, *Biomarkers in Medicine*
- **2006-present:** Tutorial Board, *Practical Proteomics*
- **2005-present:** Associate Editor, *Biomedical Microdevices*
- **2005-present:** Editor, *Expert Opinion in Drug Discovery*
- **2003 -2004:** Co-Editor-in-Chief, *Clinical Proteomics*
- **2002 - 2004:** Senior Editor, *Cancer Epidemiology Biomarkers and Prevention*
- **2002 - present:** Scientific Advisory Board, *Journal of Proteome Research*
- **2001 - present:** Associate Editor, *Molecular Carcinogenesis*
- **2001 - present:** Associate Editor, *Proteomics*

Edited Books:

2009: Clinics in Laboratory Medicine: Proteomics in Laboratory Medicine
Guest Editor: E.F. Petricoin

Journal Reviewer, 1996 to present:

1. Cancer Research
2. Molecular Cancer Therapeutics

3. Cancer Epidemiology, Biomarkers and Prevention
4. Proteomics
5. Clinical Cancer Research
6. Electrophoresis
7. Molecular and Cellular Proteomics
8. Biotechniques
9. Analytical Chemistry
10. Journal of Proteome Research
11. BMC Bioinformatics
12. JAMA
13. Nature
14. Nature Medicine
15. Nature Biotechnology
16. Science
17. Lancet
18. Lancet Oncology
19. Journal of Proteome Research

FDA Committee Memberships:

- **July 2003 - 2005:** FDA Counterterrorism Working Group
- **June 2003 - 2005:** FDA-NHGRI Pharmacogenomic Working Group
- **June 2003 - 2005:** NCI-FDA Interagency Oncology Task Force; Biomarker and Translational Science Co-Chair
- **May 2000 - 2005:** CBER Representative to the FDA Genomics/Proteomics Working Group
- **April 2000 - 2002:** CBER Representative to the Committee for the Advancement of FDA Science (CAFDAS)
- **March 1996 -1998:** Committee for the Advancement for CBER Science

Co-Inventor on the Following Issued and/or Pending Patents:

Issued Patents:

1. Patent #: 7,333,896 Quality Assurance/Quality Control For High Throughput Bioassay Process
2. Patent #: 6,969,614 Methods For The Isolation And Analysis Of Cellular Protein Content
3. Patent #: 6,925,389 Process For Discriminating Between Biological States Based On Hidden Patterns From Biological Data

Pending Patent Applications:

1. 20090275546 : Diagnostic Tests And Personalized Treatment Regimes For Cancer Stem Cells
2. 20090259360: Determining Microenvironment Conditions
3. 20090148961: Smart Hydrogel Particles For Biomarker Harvesting
4. 20090148859: MTOR Pathway Theranostic
5. 20090087346: Method For Harvesting Nanoparticles And Sequestering Biomarkers
6. 20080277578: Nanoporous Substrates For The Analytical Methods
7. 20080255243: Stat3 As A Theranostic Indicator
8. 20080243394: System, Method And Computer Program Product For Manipulating Theranostic Assays
9. 20080103063: Quality Assurance/Quality Control For High Throughput Bioassay Process
10. 0080069774: Proteomic Antisense Molecular Shield And Targeting
11. 20070275483: Biomarker Isolation And Use Thereof To Characterize Physiological State
12. 20070224644: Ocular Fluid Markers
13. 20050260671: Process For Discriminating Between Biological States Based On Hidden Patterns From Biological Data
14. 20050043593: Process For Discriminating Between Biological States Based On Hidden Patterns From Biological Data
15. 20050042636: Compositions And Methods For Detecting Abnormal Cell Proliferation
16. 20050005311: High Throughput Screening For Cancer Genes
17. 20040058388: Quality Assurance/Quality Control For High Throughput Bioassay Process
18. 20030004402: Process For Discriminating Between Biological States Based On Hidden Patterns From Biological Data