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**ELI GILBOA**
**Curriculum Vitae**

## I. PERSONAL

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|---|---|
| 2. Name: | **ELI GILBOA, Ph.D.** |
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## II. HIGHER EDUCATION

11. Institutional

Weizmann Institute of Science, Rehovot, Israel — 1973-1977
Department of Virology, Ph. D., Molecular Biology
Papovaviruses, Advisor, Dr. Haim Aviv

Hebrew University, Jerusalem, Israel — 1971-1973
M.Sc. Enzymology, Advisor, Dr. Meir Rigbi

Hebrew University, Jerusalem, Israel — 1968-1971
B.Sc., Biochemistry

12. Non-Institutional - NA
13. Certification, licensure: NA

## III. EXPERIENCE

14. Academic

University of Miami Miller School of Medicine — 2006-present
Department of Microbiology and Immunology
Miami, FL
Professor

Duke University Medical Center — 1993-2006
Departments of Surgery and Immunology
Durham, NC
Professor

Memorial Sloan-Kettering Cancer Center — 1986-1993
Program in Molecular Biology

New York, New York
Associate Member

Princeton University 1980-1986
Department of Molecular Biology
Princeton, New Jersey
Assistant Professor

Massachusetts Institute of Technology 1977-1980
Cancer Research Center
Cambridge, Massachusetts
Postdoctoral Fellow
Molecular Biology of Retroviruses
Advisor, Professor David Baltimore

15. Non academic: NA

16. Military: Israeli Defense Forces (1965-1968)

## IV. PUBLICATIONS

### 17. Chapters & Reviews

1. Gilboa, E., mRNA leap-frogs DNA to show promise for therapeutic gene transfer, Commentary, Mol. Ther. 2012, In press.

2. Gilboa, E. Tumor immunology & Immunotherapy, Viewpoint. *Nature Reviews Cancer*, 2012, In press

3. Gilboa, E. DC-based cancer vaccines. *J Clin Invest* 117:1195-1203,2007.

4. Gilboa, E. The promise of cancer vaccines. *Nat Rev Cancer* 4:401-411, 2004.

5. Gilboa, E., and J. Vieweg. Cancer immunotherapy with mRNA-transfected dendritic cells. *Immunol Rev* 199:251-263, 2004.

6. Gilboa, E. Knocking the SOCS1 off dendritic cells. *Nat Biotechnol* 22:1521-1522. 2004.

7. Sullenger, B.A., and E. Gilboa. Emerging clinical applications of RNA. *Nature* 418:252-258. 2002.

8. Gilboa, E. The risk of autoimmunity associated with tumor immunotherapy. *Nat Immunol* 2:789-792. 2001.

9. Gilboa, E. The makings of a tumor rejection antigen [In Process Citation]. *Immunity* 11:263-270. 1999.

10. Gilboa, E. How tumors escape immune destruction and what we can do about it [In Process Citation]. *Cancer Immunol Immunother* 48:382-385. 1999.

11. Gilboa, E., S.K. Nair, and H.K. Lyerly. Immunotherapy of cancer with dendritic-cell-based vaccines. *Cancer Immunol Immunother* 46:82-87. 1998.

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13. Gilboa, E. Immunotherapy of cancer with genetically modified tumor vaccines. *Semin Oncol* 23:101-107. 1996.

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15. Vieweg, J., and E. Gilboa. Considerations for the use of cytokine-secreting tumor cell preparations for cancer treatment. *Cancer Invest* 13:193-201. 1995

16. Lee, S.-W., E. Gilboa, and C. Smith. Inhibition of HIV-1 with minimal Rev responsive element (RRE) decoys. *Int. Antivirals News* 3:89-91. 1995.

17. Gilboa, E., and C. Smith. Gene therapy for infectious diseases: the AIDS model. *Trends Genet* 10:139-144. 1994.

18. Gilboa, E., H.K. Lyerly, J. Vieweg, and S. Saito. Immunotherapy of cancer using cytokine gene-modified tumor vaccines. *Semin Cancer Biol* 5:409-417. 1994.

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20. Gilboa, E. Murine models for cancer immunotherapy using cytokine gene modified tumor vaccines. In: Cytokine-Induced Tumor Immunogenicity (eds. Forni, G., Foa, R., Santoni, A., Frati, L.). *Academic Press* 131-143. 1994.

21. Gilboa, E. Retroviral gene transfer: applications to human therapy. *Prog Clin Biol Res* 352:301-311. 1990.

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23. Gilboa, E., and T. von Ruden. Retrovirus-vector-mediated antisense RNA inhibition of HTLV-1 induced cell transformation. In: Viral vectors (eds. Gluzman, J. and Hughes, S.H.). *Cold Spring Harb Symp Quant Biol* 116-121. 1988.

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26. Gilboa, E. Retrovirus vectors and their uses in molecular biology. *Bioessays* 5:252-257. 1986.

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**18. Juried or refereed journal articles or exhibitions:**

*1.* Berezhnoy, A, Stewart, C. A., James McNamara, J., Thiel, W., Giangrande, P., Giorgio Trinchieri, G., and Gilboa, E. Isolation & optimization of murine IL-10 receptor blocking oligonucleotide aptamers using high-throughput sequencing. Mol. Ther., 2012, In press.

*2.* Pastor, F., Kolonias, D, McNamara, J., Gilboa, E., Targeting 4-1BB costimulation to disseminated tumor lesions of mice using bi-specific oligonucleotide aptamers. Mol. Ther. 2011, 19(10):1878-1886

*3.* Pastor, F., Kolonias, D., Giangrande P. H., & E. Gilboa. Induction of tumor immunity by *targeted* inhibition of nonsense mediated mRNA decay. Nature, 2010, 465:227-231

*4.* van Es, T., G.H. van Puijvelde, A.C. Foks, K.L. Habets, I. Bot, E. Gilboa, T.J. Van Berkel, and J. Kuiper. Vaccination against Foxp3(+) regulatory T cells aggravates atherosclerosis. *Atherosclerosis,* 2010,209:74-80

5. Zhou, J., B. Soontornworajit, J. Martin, B.A. Sullenger, E. Gilboa, and Y. Wang. A hybrid DNA aptamer-dendrimer nanomaterial for targeted cell labeling. *Macromol Biosci. 2009,* 9:831-835

6. Dollins, C.M., S. Nair, D. Boczkowski, J. Lee, J.M. Layzer, E. Gilboa, and B.A. Sullenger. 2008. Assembling OX40 aptamers on a molecular scaffold to create a receptor-activating aptamer. *Chem Biol* 15:675-682

7. McNamara, J. O., D. Kolonias, F. Pastor, R.S. Mittler, L. Chen, P.H. Giangrande, B. Sullenger and E. Gilboa. Costimulation of CD8+ T cells and inhibition of tumor growth with multivalent 4-1BB binding aptamers. *J. Clin. Invest.*, 118:376-386, 2008.

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9. Melhem, N.M., X.D. Liu, D. Boczkowski, E. Gilboa, and S.M. Barratt-Boyes. Robust CD4+ and CD8+ T cell responses to SIV using mRNA-transfected DC expressing autologous viral Ag. *Eur J Immunol* 37:2164-2173, 2007.

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29. Morse, M.A., S.K. Nair, D. Boczkowski, D. Tyler, H.I. Hurwitz, A. Proia, T.M. Clay, J. Schlom, E. Gilboa, and H.K. Lyerly. The feasibility and safety of immunotherapy with dendritic cells loaded with CEA mRNA following neoadjuvant chemoradiotherapy and resection of pancreatic cancer. *Int J Gastrointest Cancer* 32:1-6. 2002.

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31. Faiola, B., C. Doyle, E. Gilboa, and S. Nair. Influence of CD4 T cells and the source of major histocompatibility complex class II-restricted peptides on cytotoxic T-cell priming by dendritic cells. *Immunology* 105:47-55. 2002.

32. Nishimura, J., K.L. Phillips, R.E. Ware, S. Hall, L. Wilson, T.L. Gentry, T.A. Howard, Y. Murakami, M. Shibano, T. Machii, E. Gilboa, Y. Kanakura, J. Takeda, T. Kinoshita, W.F. Rosse, and C.A. Smith. Efficient retrovirus-mediated PIG-A gene transfer and stable restoration of GPI-anchored protein expression in cells with the PNH phenotype. *Blood* 97:3004-3010. 2001.

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34. Thornburg, C., D. Boczkowski, E. Gilboa, and S.K. Nair. Induction of cytotoxic T lymphocytes with dendritic cells transfected with human papillomavirus E6 and E7 RNA: implications for cervical cancer immunotherapy [In Process Citation]. *J Immunother* 23:412-418. 2000.

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19. Other works, publications, abstracts:
20. Other works accepted for publication:

**V. PROFESSIONAL**

21. Funded Research Performed (grants received in the last five years)

Current:

NIH/NCI R01. “Expressing new tumor antigens by inhibition of nonsense mediated mRNA decay. PI: Eli Gilboa, 03/01/11-02/28/16

Komen Foundation. Potentiating Tumor Immunity in Breast Cancer Patients using Aptamer-Targeted Foxp3 siRNA to Inactivate Regulatory T cells. PI: Eli Gilboa, 04/01/10-03/31/13

Komen Foundation. Development of Agonistic 4-1BB Aptamers to Enhance Vaccine-Induced Tumor Immunity PI: Eli Gilboa, 02/01/09-01/31/12

NIH/NIAID R21. Oligonucleotide aptamer ligands to reverse T cell anergy in HIV-infected patients. PI: Eli Gilboa; 05/01/10-04/31/12

Completed:

NIH, NCI, R01 CA85307, Tumor RNA transfected dendritic Cell Vaccines
PI: Eli Gilboa, 4/1/00-3/31/05
$157,500/year direct costs; $85,050/year indirect costs; $1,212,750 Total Costs

NIH, NCI R01 CA098637, Cancer Immunotherapy Targeting Endothelial Antigens
PI: Eli Gilboa, 7/1/03-4/30/08, 20% effort
$195,544/year direct costs; $105,594/year indirect costs; $1,505,690 Total costs

Awarded patents:

| | |
|---|---|
| #5,658,775 (Aug1997) | Double copy retroviral vector |
| #5,831,068 (Nov 1998) | Method to increase density of antigen presenting cells |
| #5,853,719 (Dec1998) | Methods for treating cancers and pathogen infections using APC loaded with mRNA |
| #6,387,701 (May 2002) | Method of identifying tumor antigens that elicit a T-cell response |
| #6,537,807 (March 2003) | Hematopoietic stem cells |
| #6,670,186 (Dec 2003) | RNA loaded antigen presenting cells |

22. Editorial responsibilities:

2006-present Consulting editor, Journal of Clinical Investigations
2011- present Editorial Board, OncoImmunology
2011- present Editorial Board, Vaccines
2012-present Editorial Board, Molecular Therapy Nucleic Acids

Scientific Advisory Board, Wistar Institute, 1997-2004
Scientific Advisory Board, Yale Cancer Center, from 2001
External Advisory Committee, Stanford Bone Marrow Program Project, from 2004
External Advisory committee, Duke Brain SPORE, from 2008

23. Professional and Honorary Organizations

American Association for Cancer Research
American Association for Gene Therapy
American Association for Immunology
American Society for Microbiology
American Society for Bloody and Marrow Transplantation

24. Honors and Awards

Chaim Weizmann Fellow, 1977-1979
NIH M.E.R.I.T. Award, 1992
4th Milano Price for Gene Therapy Research, 1993
CapCURE Foundation Research Award for Gene Therapy for Prostate Cancer, 1993 & 1994

25. Postdoctoral Fellowships: N/A

26. Other Professional Activities:

Director, Dodson Interdisciplinary Immunotherapy Institute, University of Miami, present
Co-leader, Tumor Immunology Program, UM/Sylvester Comprehensive Cancer Center, present

European Research Council Immunology section grant review board, 2010 – 2015
Israeli Cancer Research Foundation grant review board, 2010-2013
NIH GDD study section, from 2012

Bayer Innovation Expert Panel, 2008
Chairperson, gene therapy subsection, AACR 2006 program committee
Expert panel, Nature Milestones Cancer, 2006
Cancer Research Editorial Board 2002-2006
March of Dimes study section for basic research, 1993 – 1996
NIH study section for AIDS-related research, 1990-1992

Invited Speaker, meeting & symposia:

**2011**

1. Korean olignucleotide therapeutic society, Seoul, South Korea, October 31st, 2011
2. Paswell symposium, Weizmann Institute, Rehovot, Israel, July 11th, 2011

**2010**

1. Oligonucleotide Therapeutics Society, Dana Point, CA, October 20-22, 2010
2. RNA therapeutics, Howard Hughes Medical Institute, Janelia Farms, VA, September 26-29, 2010

**2009**

1. Society for Basic Urology & Society for Urologic Oncology, April 24-26, 2009
2. Gene Therapy & Vaccine Graduate Group, University of Pennsylvania, May 4, 2009
3. 3rd Annual Interdisciplinary Stem Cell Institute Symposium, Universit of Miami, May 15, 2009
4. Glioma consortium, University of Leuven, December 2nd, 2009

**2008**

1. International Society for Cellular Therapy's 14th Annual Meeting, Miami,FL May 17-20, 2008.
2. First International Conference "Translational Research in Oncology, Forli, Italy, May 14-17, 2008
3. International Cancer Immunology and Immunotherapy Meeting, Athens, Greece, Oct 8-12, 2008
4. Immunotherapy 2008: Implementing combinations, Havana, Cuba, Nov 10-14, 2008
5. MD Anderson Clinical and Translational Immunology, Housto, TX, April 30th, 2008
6. UM Innovation, Miami, December 2-3, 2008

**2007**

7. International symposium on immunology & immunotherapy of cancer, Pamplona, Spain, January 14-16, 2007.

8. Miami Winter Symposium on innate immunity & novel vaccines. Miami, FL, January, March 28-31, 2007.

9. ITMAT Annual Symposium on "Personalized Medicine: Prospects or Pipedream", U. Pennsylvania, Philadelphia, April 22, 2007.

10. 5th International Meeting on "Dendritic cell vaccination & other strategies to tip the balance fo the immune system", Bamberg, Germany, July 16-18, 2007

11. Charles Dohme Memorial Symposium on "Discoveries in immunology and cancer development", October 2nd, 2007.

12. Cancer Vaccines/Adjuvants/Delivery for the Next Decade, Oct 2007, DKFZ, Heidelberg, Germany

13. European Society for Molecular Oncology (ESMO) International Symposium in Immunology, Nov 2007, Athens, Greece.

**2006**

14. 2nd Mildred Scheel Cancer Conference on "Targeted Cancer Therapies: from Vision to Clinical Practice"; Bonn, Germany, April 26-28, 2006

15. 97th Annual Meeting of the American Association of Cancer Research (AACR); Washington DC, April 1-5, 2006

    I. Symposium on "Advances in Immunotherapy"

    II. Educational session: "Harnessing the host immune response to cancer"

16. "Metastasis, AIDS and Immunotherapy", Weizmann Institute, Rehovot, Israel, March 12-14, 2006

17. "The second international cancer vaccine meeting", Sienna, Italy, December 11-12, 2006

18. Moffitt cancer center grand rounds, September 27, 2006

19. Cincinnati Childrens Hospital Distinguished lecture series, Cincinnati, OH., April 17, 2006

20. Cancer Research Institute symposium on cancer immunotherapy, New York, NY, October 4-6, 2006.

21. AACR meeting on Tumor Immunology: An Integrated Perspective, Miami, FL., Nov 29-Dec 2, 2006

**2005**

22. "Vaccination, Infection & Autoimmunity: Myth & Reality", Lausanne, Switzerland, October 26-28, 2005

23. 9th International Cancer Symposium on Novel Perspectives of Gene and Cell Therapy, Yonsei Medical Center, Seoul, Korea, November 16-19, 2005

24. Leukemia & Lymphoma Society Stohlman Scholar Scientific Meeting, Scottsdale, Arizona, September 23-24, 2005

25. 4th European Society meeting in Forensic Genetics and Molecular & Cellular Medicine, Dubrovnik, Croatia, September 5-9, 2005

26. “Novel Therapeutic Approaches to Cancer, Jerusalem, Israel, March 16-18, 2005

27. Ruth Marshak Memorial Lecture in Cancer Immunology, Boston University, Boston, Nov 2, 2005

**2004**

28. 19th Annual Meeting of the International Society for Biological Therapy of Cancer (ISBT), San Francisco, CA, November 4-7, 2004

29. Oncology Interest Group meeting, Johnson & Johnson, New Brunswick, October 26-27, 2004

30. 8th International Symposium on Dendritic Cells, Brugge, Belgium, October 17-21, 2004

31. 7th annual meeting of the American Society of Gene Therapy (ASGT), Minneapolis, MN, June 2-6, 2004

32. NHLBI working group on “Novel Targeted Cell-based Therapy for Hematological Malignancy”, Washington DC, August 27, 2004

33. 3rd International congress on Targeted Therapies in Oncology, Washington, DC., August 27-29, 2004

34. Keystone symposium on “Molecular mechanisms of HIV pathogenesis, Whistler, Canada, April 11-18, 2004

**2003**

35. 33rd Annual Meeting of the Japanese Society for Immunology, Fukuoka, Japan, December 8-10, 2003

36. Dendritic cells: Biology & Therapeutic Applications”, Madrid, Spain, October 6-8, 2003.

37. 2nd Journees des Cordeliers conference on “Latest advances in Immunonotherapy”, Paris, France, October 1-3, 2003

38. 4th International Expert Meeting on Clinical Dendritic Cell Immunotherapy, Amsterdam, Netherlands, June 13-16, 2003.

39. 1st Annual Meeting of the European Cancer Immunotherapy Society (CIMT), Maintz, Germany, May 8-9, 2003.

40. Keystone symposium on “Dendritic Cells: Interfaces with Immunobiology & Medicine, Keystone, CO, March 3-8, 2003.

41. Keystone symposium on “Basic Aspects of Tumor Immunology, Keystone, CO, February 17-23, 2003.

**Lectureships** (from 2005)

Keynote speaker; International Symposium on "Recent Progress in Cell-and Gene-based Cancer Therapy", Yonsei University, Seoul, Korea, November 2005

Ruth Marshak Memorial Lecture in Cancer Immunology, Boston University, November 2005

Distinguished lecturer, Immunology seminar series, Cincinnati Children's Medical Center, April 2006

**VI. TEACHING**

27. Teaching Awards Received: N/A

28. Teaching Specialization (courses taught):

2011:
- Dendritic cell biology (Principle in Immunology, MIC 628)
- Tumor immunotherapy (Cancer Biology Program, CAB 612)

2010:
- Dendritic cell biology (Principle in Immunology, MIC 628)
- Tumor immunotherapy (Cancer Biology Program, CAB 612)

2009 – Tumor vaccines. UM Cancer Biology Program

2008 – Tumor immunotherapy & Immunology. UM MIC 628

2008 – Tumor vaccines. UM Cancer Biology Program

2007 – Tumor immunoterapy & Immunology, UM MIC 605

2005 – Tumor Immunology - A review of the immunological basis for tumor surveillance and recognition

2004 – Immunology - Fundamentals and therapeutic applications.

2003 – Tumor immunology - A review of the immunological basis for tumor surveillance and recognition

29. Thesis and Dissertation Advising/Post-doctoral student supervision (chairman or committee member; topic; student name; date)

| TRAINEE (LAST NAME, FIRST) | TYPE (PRE/POST) | TRAINING PERIOD | DEGREES(S), INSTITUTION AND DATE OF DEGREE | TITLE OF RESEARCH PROJECT |
|---|---|---|---|---|
| **PAST TRAINEES** | | | | |
| Li, Mingxia | Predoc. | 1988-1992 | Cornell University Medical Center, Ny. Ph.D. | MTV Resistance Gene Transfer in Mice |
| Gansbacher, Bernd | Postdoc. | 1988-1990 | University of Rome, M.D. | Cancer Gene Therapy |
| Fetten, James | Postdoc. | 1989-1991 | New York University, M.D. | Immunization via Gene Transfer |
| Sullenger, Bruce | Predoc. | 1987-1991 | Cornell University Medical Center, NY | RNA Decoys |
| Connor, John | Postdoc. | 1990-1992 | Columbia University, M.D. | Bladder Cancer Gene Therapy |
| Szabolcs, Paul | Postdoc. | 1991-1993 | University of Szeged | Immunotherapy with Macrophages |
| Roy, Nita | Predoc. | 1989-1993 | Banghor University, India | Antigen Presentation of CTL |

| | | | | |
|---|---|---|---|---|
| Bannerji, Rajat | Predoc. | 1989-1993 | Cornell Medical Center New York | Mechanism of Antitumor-T Cell Induction |
| Smith, Clayton | Postdoc. | 1988-1992 | MD, 1984 University of Texas Dallas, TX | HIV Gene Therapy |
| Vieweg, Johannes | Postdoc. | 1987-1991 | University of Ulm, M.D. | Prostate Cancer Gene Therapy |
| Larchian, William | Postdoc. | 1993-1996 | Boston University, MA | Bladder Cancer Gene Therapy |
| Lee, Seong-Wook | Predoc. | 1994-1997 | University of Seoul Seoul, Korea | HIV Inhibition Strategies |
| Nair, Smita | Postdoc. | 1993-1996 | University of Tennessee, Ph.D. 1993 | HIV Gene Therapy |
| Abolnik, Igor | Postdoc. | 1993-1996 | University of Tennessee Knoxville, Tennessee | Cytokine Modified Cancer Gene Therapy |
| Giorgio, Selma | Postdoc. | 1999-2000 | Escola Paulista de Sao Paulo, SP, Brazil, Ph.D. 1993 | Human CTL Priming |
| Pitterle, Diana | Postdoc. | 1999-2000 | Duke University Medical Center, Ph.D. 1991 | Antigen Discovery |
| Hess, Paul | Predoc. | 1997-2001 | Mississippi State University, DVM, 1992 Rutgers University, B.S., 1985 | Prostate Cancer Immunotherapy |
| Santulli-Marotto, Sandra | Postdoc. | 1999-2005 | University of North Carolina at Chapel Hill | CTLA-4 Inhibition |
| Martin Fassnacht | Postdoc. | 2003-2005 | University of Wuerzburg | Cancer Immunotherapy targeting stromal antigens |
| Ayako Wakatsuki | Postdoc. | 2004-2006 | University College London | CD4+ T cell Immunity |
| Caterina Milazzo | Postdoc. | 2003-present | University of Munich | CD4+ T Cell Immunity |
| Jaewoo Lee | Postdoc. | 2004-present | Suny-Buffalo, Buffalo, NY | Stromal Immunotherapy |
| Gouri Yogalingam | Post doc | 2006 - 2007 | University of Adelaide, Adelaide, Australia, 1998 | CD40 costimulation |
| Vidya Chandramohan | Post doc | 2006 - 2007 | Boston University, Boston, MA, 2005 | Class II processing |
| James McNamara | Post doc | 2004 - | Duke University, Durham, | 4-1BB aptamers |

| | | | | |
|---|---|---|---|---|
| | | 2007 | NC, 2004 | |
| Claudia Dollins | Graduate student | 2003 - present | | OX-40 aptamers |
| Alessia Zoso | Post doc | 2007 - present | John Hopkins University | Potentiating tumor cell immunogenicity |
| Divya Patel | | | | |
| Rajiv Vaidya | | | | |
| **CURRENT TRAINEES** | | | | |
| Fernando Pasto | Post doc | 2007 - | University of Navarra, Pamplona, Spain, 2006 | T cell survival |
| Alexey Berezhnoy | Post doc | 2008 - | Univeristy of Moscow | Aptamer modulation of IL-10 receptor |
| Dawn Seales | Graduate student | 2007 | Universit of Miami | Targeted inhibition of T cell attenuation |
| Randall Brennerman | MD/Ph.D. student | 2007 | University of Miami | Inhibition of TGFbetta suppression of tumor immunity |
| Marcio Bajgelman | Post doc | 2009 | University of San Paulo, Brazil | Inactivation of Treg |
| Joung Kim | Research Associate | 2009 | University of Seoul, Korea | Elimination of autoreactive T cells. |

**VII. SERVICE**

30. University Committee and Administrative Responsibilities

1. Scientific Steering Committee, UM/Sylvester Comprehensive Cancer center, present
2. Dean's Cabinet.
3. International Medicine Institute
4. Translational track for PhD programs cmtee.

31. Community Activities: N/A