Curriculum vitae

Georges Abboud, American citizen

Research Assistant Scientist at the Department of Pathology, Immunology, and Laboratory Medicine University of Florida, 1395 Center Dr, Gainesville, Fl, 32610-0275
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EDUCATION/DIPLOMAS

September 2009: animal experimentation level 1 (national certified diploma: Lille France)

May 19th 2008: Ph.D. in Immunology (with honors)

October 2002-May 2008: DEA/Master's degree (5th year university diploma) and PhD student in Immunology at the « Lille 2 University, Institut Pasteur de Lille », France

2001-2002: BSc (4th year university diploma with honors) in Animal Biology at the Lebanese University, Faculty of Sciences III, Tripoli-Lebanon

2000-2001: Licence (3rd year university diploma with honors) in Animal Biology at the Lebanese University, Faculty of Sciences III, Tripoli-Lebanon

LANGUAGES

English (fluent), **French** (fluent), Spanish (basic), Japanese (basic) and Arabic (mother tongue)

RESEARCH AND TRAINING

November 2017- present : Research Assistant Scientist at the University of Florida, Department of Pathology (PI: Dr Laurence Morel) working on autoreactive versus viral specific immune responses in lupus and arthritis mouse models. We are pursuing the work on finding specific metabolic and costimulatory signatures of autoreactive T and B cells that help alleviating specifically autoimmunity without compromising immunity to foreign antigens. We are studying innate and adaptive immunoregulatory mechanisms that modulate disease in lupus mouse models. We are also trying to take lessons from lupus susceptibility genes that are providing resistance to otherwise lethal respiratory.

February 2017-October 2017: postdoctoral fellow working on autoimmune diseases and viral immunizations in mice (**BSL-2 animal facility**) at the University of Florida, department of Pathology (PI: Dr Laurence Morel). While many immunosuppressive agents are used to treat autoimmune diseases like SLE and arthritis, the capacity of the immune system of the patient, under treatment, to mount a response against vaccines/environmental antigens is not well taken into account. Therefore we started using mouse models of lupus that are vaccinated with Flu strains and we are studying the metabolism and activation of autoreactive versus Flu specific T cells (TFH, Th1 and cytotoxic CD8 cells) in order to design a treatment (targeting cell metabolism or

costimulatory molecules) that specifically attenuates autoimmunity. The metabolic inhibitors we are using for lupus treatment not only preserve peptide-specific TFH response (our previous data) but also Flu specific TFH and cytotoxic CD8 responses. Successful metabolic inhibitors in arthritis mouse model is also currently studied at the level of effector phase (neutrophils and macrophages).

August 2012-January 2017: postdoctoral fellow working on viral immunizations and infections in mice and humans (**BSL-2 animal facility**) at the University of Florida, department of Pathology (PI: Dr Shahram Salek-Ardakani). Our research was directed towards a better understanding of host-pathogen interactions at the mucosal surfaces. In particular, we focused on TFH and CD8 T cell differentiation and regulation by TNFR family like CD27/CD70 OX40/OX40L and LIGHT/HVEM as well as transcription factors like Bcl11b. We showed the dynamics, migration and programming of CD8 memory T cells within the lungs and their role in providing the ultimate protection against lethal respiratory viral encounter. We also showed the key signals and mechanisms that allow maintaining of the CD8 memory cells at the mucosal sites. We also showed the importance of NK- and CD8-derived IFNγ to rescue mice from lethal viral infection by controlling viral replication and dissemination.

November 2008-June 2011: postdoctoral fellow working on probiotics and inflammatory bowel diseases in humans (ulcerative colitis and pouchitis: clinical study) and mouse models (*Clostridium difficile* infection/colitis: **BSL-2 animal facility**) at BLIM, CIIL, Institut de Biologie de Lille-Institut Pasteur de Lille (director: Pr Bruno Pot). Ulcerative colitis/pouchitis clinical trial: collaboration with University Hospital Gasthuisberg-Belgium: Pr Paul Rutgeerts and Dr Vicky De Preter. Our lab was able to select probiotic strains with immunoregulatory potential (inducing *in vitro* high IL-10 and low IL-12 production from PBMC) and use them to prevent experimental colitis in mice. Immunosuppressive strains of Lactobacilli and Bifidobacterium were then used in other mouse models of *C. difficile* infection but mostly in clinical trials (UC and Pouchitis) in order to attenuate the disease and maintain the patients in remission phase. My role was to investigate the mechanism of protection by studying the modulation of immune markers within sera and colon biopsies from patients.

October 2003-May 2008: PhD thesis focused on the role of innate immune cells, PPAR-alpha and Fc receptors in bowel, skin and lung diseases in mice and humans at the Inserm U547-Institut Pasteur de Lille (director: Pr Monique CAPRON) under the supervision of Pr David Dombrowicz. This was done in collaboration with dermatologists from Hôpital Claude Huriez, Lille-France: Pr E. Delaporte and Pr D. Staumont-Sallé. On one hand, our lab showed that inducing the expression of Fc epsilon RI (high affinity receptor for IgE) on immune cells other than mast cells and basophils accelerate the transport of bacteria from intestinal lumen to draining lymph nodes which drastically enhances colitis. I was studying the potential implication of intestinal dendritic cell in colitis. On the other hand we were able to target Fc epsilon and Fc gamma (specific for IgG) receptors in the skin and attenuate atopic dermatitis (AD) and associated lung inflammation by enhancing IL-10 production but mostly by increasing the number of Foxp3 expressing Treg cells in the dermis. We also showed that Fc epsilon RI or Fc

gamma RIII specifically regulates the expression of its own ligand (IgE and IgG_1) by modulating IL-4 and IL-21 expression respectively. We also demonstrated the drastic immunoregulatory role of PPAR-alpha in AD which surprisingly had a specific effect on Th1 and Th2 cells (not innate cells) and associated IgG and IgE responses.

2002-2003: DEA (Masters) work focused on using small interfering RNA and TLR ligands to modulate Prion Diseases where normal prion protein, found in many cells, becomes abnormal and clump in the brain, causing brain damage. IFR17-Institut Pasteur de Lille (director: Pr Monique CAPRON) under the supervision of Dr Georges Bahr and co-supervision of Dr Jamal Khalife who are leading scientists in France in the major of immunity (including autoimmune SLE) and infections. Following the success of other teams in using some TLR ligands in protecting against Prion Disease, we started testing other TLR ligands and small interfering RNA in order to attenuate Prion protein expression *in vitro* by using neuronal cell lines and *in vivo* using mouse models (intra-cerebral injection of scrappy prion protein). We were able to inhibit by 70 % the expression of Prion protein *in vitro* (siRNA method) and significantly inhibit the Prion protein expression in the brain of mice.

May 2004: training period at the microbiology laboratory, Faculty of Pharmacy- Lille 2 University under the supervision of Dr Christel Neut

October-november 2001: training period at the general hematology laboratory at the "Centre Hospitalier du Nord" (Zghorta, Lebanon) under the supervision of Dr S. El SAMAD

TECHNICAL SKILLS

Cellular Biology: culture of human or animal cell lines and primary cells (isolated from different organs), differentiation of bone marrow-derived cells, use of **multicolour flow cytometer** (Becton Dickinson FACSCalibur, **LSR Fortessa**), cell purification (density gradient and bead-based isolation methods) and sorting, *in vivo* and *ex vivo* T cell proliferation assays, Transwells-system (cell co-culture), Trans Epithelial Electric Resistance (TEER) and Trans Epithelial Water Loss (TEWL) Measurements

Microbiology: culture, identification and antimicrobial susceptibility testing of aerobic and anaerobic bacteria (commensal and pathogenic bacteria). Viral titration. Development of mouse models of infectious diseases (**bacterial and viral**).

Molecular Biology: RNA/DNA extractions (Cesium Chloride Gradient method, Qiagen columns), gel electrophoresis, classical PCR, real-time PCR (Agilent Mx3005P QPCR System), gene array (Roche LightCycler 480), Northern blots. Cellular transfection and RNA interference, primer design (Beacon Designer, Primer3), nucleotide and protein blast (Basic Local Alignment Search Tool on NCBI), genome browser (NCBI, Ensembl)

Cytokines/hormones/proteins/bacterial dosage using ELISA, Beckman spectrophotometer

Histology : tissue inclusion in wax or cryomounting medium, cutting sections using the Leica RM2265 microtome or cryosections using the Leica Jung CM3000 cryostat, histological staining (including May-Grünwald/Giemsa, Martius Scarlet Blue, nile red), immunohistochemistry and immunofluorescence

Microscopic observations: photonic, epifluorescence (AxioImager Z1 apoptome, LEITZ DMRB, Leica, EVOS microscope AMG) and **confocal microscopy** (Leica R2-225), image analysis

Animal Experimentation: anesthesia; irradiation, oral, sub-cutaneous, intraperitoneal, intravenous, intramuscular, **intranasal and intratracheal administration/infections**; intestinal loops, epicutaneous sensitization, nebulization, bronchoalveolar lavage, bleed mice and organ extraction, adoptive cell transfer and proliferation assays

PUBLICATIONS

Desai P, Stanfield J, Tahiliani V, **Abboud G**, Salek-Ardakani S. Lack of B Lymphocytes Enhances CD8 T Cell-Mediated Resistance against Respiratory Viral Infection but Compromises Memory Cell Formation. J Virol. 2020 Jan 17;94(3).

Elshikha AS, **Abboud G**, Van der Meijden-Erkelens L, Lu Y, Chen MJ, Yuan Y, Ponjee G, Zeumer L, Satoh M, Morel L, Song S. Alpha-1-Antitrypsin Ameliorates Pristane Induced Diffuse Alveolar Hemorrhage in Mice. J Clin Med. 2019 Aug 29;8(9).

Li W, Elshikha AS, Cornaby C, Teng X, **Abboud G**, Brown J, Zou X, Zeumer L, Robusto B, Choi SC, Fredenburg K, Major A, Morel L. T cells expressing the lupus susceptibility allele Pbx1d enhance autoimmunity and atherosclerosis in dyslipidemic mice. J Clin Invest. In revision

Calise SJ, **Abboud G**, Kasahara H, Morel L, Chan EKL. Immune Response-Dependent Assembly of IMP Dehydrogenase Filaments. Front Immunol. 2018 Nov 29;9:2789.

Elshikha AS, Yuan Y, Lu Y, Chen MJ, **Abboud G**, Akbar MA, Plate H, Wolney H, Hoffmann T, Tagari E, Zeumer L, Morel L, Song S. Alpha 1 Antitrypsin Gene Therapy Extends the Lifespan of Lupus-Prone Mice. Mol Ther Methods Clin Dev. 2018 Oct 18;11:131-142.

Choi SC, Titov AA, **Abboud G**, Seay HR, Brusko TM, Roopenian DC, Salek-Ardakani S, Morel L. Inhibition of glucose metabolism selectively targets autoreactive follicular helper T cells. Nat Commun. 2018 Oct 22;9(1):4369.

Abboud G, Choi SC, Kanda N, Zeumer-Spataro L, Roopenian DC, Morel L. Inhibition of Glycolysis Reduces Disease Severity in an Autoimmune Model of Rheumatoid Arthritis. Front Immunol. 2018 Sep 3;9:1973.

Desai P, Tahiliani V, **Abboud G**, Stanfield J, Salek-Ardakani S. Batf3-Dependent Dendritic Cells Promote Optimal CD8 T Cell Responses against Respiratory Poxvirus Infection. J Virol. 2018 Jul 31;92(16).

Sivakumar R, **Abboud G**, Mathews CE, Atkinson MA, Morel L. Protective Role of Myeloid Cells Expressing a G-CSF Receptor Polymorphism in an Induced Model of Lupus.Front Immunol. 2018 May 9;9:1053.

Hutchinson T.E., Tahiliani V., **Abboud G.**, Varkoly K., Salek-Ardakani S. In an adaptive immune response, interferon-γ inhibits vaccinia virus replication in mouse lung epithelial cells. Paper in preparation

Desai P., Tahiliani V., Hutchinson T., Dastmalchi F., Stanfield J., **Abboud G.**, Thomas P.G., Ware C.F., Song J., Croft M., Salek-Ardakani S. The TNF Superfamily Molecule LIGHT Promotes the Generation of Circulating and Lung-Resident Memory CD8 T Cells following an Acute Respiratory Virus Infection. J Immunol. 2018 Mar 7.

Desai P., Tahiliani V., Stanfield J., **Abboud G.**, Salek-Ardakani S. Inflammatory monocytes contribute to the persistence of CXCR3hi CX3CR1lo circulating and lung-resident memory CD8+ T cells following respiratory virus infection. Immunol Cell Biol. 2018 Jan 4.

Desai P., **Abboud G.**, Stanfield J., Thomas P.G., Song J., Ware C.F., Croft M., Salek-Ardakani. HVEM Imprints Memory Potential on Effector CD8 T Cells Required For Protective Mucosal Immunity. J Immunol. 2017 Oct 15;199(8):2968-2975.

Slütter B., Van Braeckel-Budimir N., **Abboud G.**, Varga SM., Salek-Ardakani S., Harty J.T. Dynamics of influenza-induced lung-resident memory T cells underlie waning heterosubtypic immunity. Sci Immunol. 2017 Jan 6;2(7).

Tahiliani V., Hutchinson T.E., **Abboud G.**, Croft M., Salek-Ardakani S. OX40 Cooperates with ICOS To Amplify Follicular Th Cell Development and Germinal Center Reactions during Infection. J Immunol. 2017 Jan 1;198(1):218-228.

Abboud G., Desai P., Dastmalchi F., Stanfield J., Tahiliani V., Hutchinson T.E., Salek-Ardakani S. Tissue-specific programming of memory CD8 T cell subsets impacts protection against lethal respiratory virus infection. J Exp Med. 2016 Dec 12;213(13):2897-2911.

Abboud G., Stanfield J., Tahiliani V., Desai P., Hutchinson T.E., Lorentsen K.J., Cho J.J., Avram D., Salek-Ardakani S. Transcription Factor Bcl11b Controls Effector and Memory CD8 T cell Fate Decision and Function during Poxvirus Infection. Front Immunol. 2016 Oct 13;7:425.

Abboud G., Tahiliani V., Desai P., Varkoly K., Driver J., Hutchinson T.E., Salek-Ardakani S. Natural Killer Cells and Innate Interferon Gamma Participate in the Host Defense against Respiratory Vaccinia Virus Infection. J Virol. 2015 Oct 14;90(1):129-41.

Goulding J., **Abboud G.**, Tahiliani V., Desai P., Hutchinson T.E., Salek-Ardakani S. CD8

T cells use IFN-γ to protect against the lethal effects of a respiratory poxvirus infection. J Immunol. 2014 Jun 1;192(11):5415-25.

Kanda A., Driss V., Hornez N., Abdallah M., Roumier T., **Abboud G.**, Legrand F., Staumont-Sallé D., Quéant S., Bertout J., Fleury S., Rémy P., Papin J.P., Julia V., Capron M., Dombrowicz D. Eosinophil-derived IFN-gamma induces airway hyperresponsiveness and lung inflammation in the absence of lymphocytes J Allergy Clin Immunol. 2009 Sep;124(3):573-82, 582.e1-9.

Abboud G., Staumont-Sallé D., Kanda A., Roumier T., Deruytter N., Lavogiez C., Fleury S., Rémy P., Papin J.P., Capron M., Dombrowicz D. Fc(epsilon)RI and FcgammaRIII/CD16 differentially regulate atopic dermatitis in mice. J Immunol. 2009 May 15;182(10):6517-26.

Staumont-Sallé D. [1], **Abboud G.** [1], Brénuchon C., Kanda A., Roumier T., Lavogiez C., Fleury S., Rémy P., Papin J.P., Bertrand-Michel J., Tercé F., Staels B., Delaporte E., Capron M., Dombrowicz D. J Allergy Clin Immunol. 2008 Apr;121(4):962-8.e6. ([1]: equal contribution)

Macia L., Delacre M., **Abboud G.**, Ouk T.S., Delanoye A., Verwaerde C., Saule P., Wolowczuk I. Impairment of dendritic cell functionality and steady-state number in obese mice. J Immunol. 2006 Nov 1;177(9):5997-6006.

In preparation

Abboud G., Choi SC, Elshikha AS and Morel L. Dissecting the contribution of different DC subsets to T-dependent protein immunization in mice.

Abboud G., Choi SC and Morel L. Chemotaxis-mediated protection from lethal Flu infections in a systemic lupus mouse model.

PRESENTATIONS

Chemotaxis-mediated protection from lethal Flu infections in a systemic lupus mouse model. Poster presented at College of Medicine Celebration of Research - Feb 2020

Swift protection from Flu infections in a systemic lupus mouse model. Poster presented at College of Medicine Celebration of Research - Feb 2019

Swift protection from Flu infections in a systemic lupus mouse model. Poster will be presented at the 2019 AAI meeting

Protection from lethal flu infections: Lessons from a systemic lupus mouse model Poster presented at College of Medicine Celebration of Research - Feb 2018

Anatomical basis for protective immunity (chosen for oral presentation)
Resident Research Day, June 2016, Department of Pathology, Immunology, and Laboratory Medicine University of Florida

Natural Killer Cells Participate in Host Defense against Respiratory Vaccinia Virus Infection (poster presentation)
The center for Inflammation and Mucosal Immunology. 2nd Annual Research Retreat. College of Medicine. University of Florida. November 2014

Innate signature for protective vaccine (poster presentation)
University of Florida Postdoc Research Symposium. October 2013

The role of Fc epsilon RI, Fc gamma RIII and PPAR-alpha in Atopic Dermatitis (oral presentation)
National Institute of Allergy and Infectious Diseases, Bethesda MD, September 2011.

The role of Fcepsilon receptors, Fcgamma receptors and PPAR-alpha in Atopic Dermatitis (oral presentation)
Children's Hospital-Harvard Medical School, Division of Immunology. May 2008.

The role of Fcepsilon receptors and Fcgamma receptors in Atopic Dermatitis (oral presentation)
Université Pierre et Marie Curie - Paris 6, Hôpital de la Pitié – CERVI. February 2008.

IgE Receptors, FcepsilonRI and CD23, Differentially Regulate Development of Atopic Dermatitis (poster presentation)
Abstract of first Joint Meeting of European National Societies of Immunology, 16th European Congress of Immunology. September 2006

Grants

ACTIVE

- 416522 Morel (PI) 07/01/2016-06/30/2019 40% effort

ALR $555,555 total
Targeting follicular helper CD4 T cells in SLE
We propose the hypothesis that the elimination of lupus Tfh cells through glucose inhibition represents a safe therapeutic approach. We propose to test this hypothesis by characterizing lupus Tfh cells relative to Tfh cells induced by immunization in mouse models and cells obtained from lupus patients.
Role: co-investigator

- R01 AI128901 Morel (PI) 12/01/2016-11/31/2021 60% effort

NIH/NIAID $250,000
Targeting follicular helper CD4 T cells in SLE
The goal of the proposal is to prove the hypothesis that the elimination of lupus Tfh cells through glucose inhibition represents a safe therapeutic approach. We propose to test

this hypothesis by characterizing lupus Tfh cells relative to Tfh cells induced by immunization in mouse models and cells obtained from lupus patients.
Role: co-investigator

Reviewing of Scientific Journals

- Co-Reviewer of the publication: The cytokine network type I IFN-IL-27-IL-10 is augmented in murine and human lupus. J Leukoc Biol. 2019 Oct;106(4):967-975.

- Reviewer on the publication: PI3K Orchestrates T Follicular Helper Cell Differentiation in a Context Dependent Manner: Implications for Autoimmunity. Front Immunol. 2019 Jan 7;9:3079.

- Reviewer on the publication: CCR9 Expressing T Helper and T Follicular Helper Cells Exhibit Site-Specific Identities During Inflammatory Disease. Front Immunol. 2019 Jan 4;9:2899.

- Reviewer on the publication: Low Peripheral T Follicular Helper Cells in Perinatally HIV-Infected Children Correlate With Advancing HIV Disease. Front Immunol. 2018 Aug 24;9:1901.

- Co-reviewer on the publication: Prophylactic and Therapeutic Effects of IL-2/anti-IL-2 Complexes in SLE-like chronic Graft-versus-Host Disease (Frontiers in Immunology)

TEACHING AND SUPERVISING

Supervision and guidance in designing experiments and using flow cytometry to PHD students and postdoctoral fellows and other scientists at UF, Pathology Department.

Supervision of Alexa Roth (PhD student candidate) at the University of Florida in her five-week rotation. November-December 2014

Supervision of Master's student Jérome Breton at BLIM, Institut Pasteur de Lille October 2010

During thesis : supervision of Delphine Staumont (MD, PhD) and Juan Shu Shen (Master's) and postdoctorates Nathalie Deruytter (PhD), Akira Kanda (MD) and Severine Quéant (PhD) at the Institut Pasteur de Lille. 2004-2008

June-July 2005: supervision of Jean-Benoît Hennequin and Cécile Decoster (BSc) at the Institut Pasteur de Lille

March 2004: supervision of Nathalie Duchatelet (undergraduate) at the Institut Pasteur de Lille

Since 1998: tutoring biology, maths, physics, chemistry and English

COMPUTER AND STATISTICS

Word, Excel, Endnote, Power Point, Statistical tests, GraphPad Prism 6, FlowJo, Adobe Photoshop and internet

REFERENCES

Shahram Salek-Ardakani, PhD. Director of Cancer Immunology at Pfizer
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