BIOGRAPHICAL SKETCH

NAME: **Abdallah BADOU**

eRA COMMONS USER NAME (credential, e.g., agency login): abdallahbadou

POSITION TITLE: **Professor of Immunology and Molecular Biology**

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion MM/YYYY	FIELD OF STUDY
Hassan II University, Casablanca, Morocco	BSc	07/1992	Biology (option: Immunology)
René Descartes University, Paris, France	MSc	07/1994	Physiology
Paul Sabatier University, Toulouse, France	PhD	06/1998	Immunology
Yale University, Connecticut, USA	Post-doc	02/2005	Immunology and Molecular Biology
Yale University, Connecticut, USA	Associate Research Scientist	02/2007	Immunology and Molecular Biology
Cadi Ayyad University, Marrakech, Morocco	« Professeur habilité »	05/2012	Immunology and Molecular Biology

A. Specific Statement

I have completed my Master's degree in René Descartes University (Paris, France) in 1994, then my PhD in Immunology in 1998 at Paul Sabatier University (Toulouse, France). Afterwards, I joined the Immunobiology department at Yale University School of Medicine (Connecticut, USA) from 1999 to 2007, as a post-doc then as a research scientist. In 2007, I joined Cadi Ayyad University in Morocco as assistant then qualified professor (2007 to 2014). Since 2014, I was affiliated to the Faculty of Medicine and Pharmacy of Casablanca. During the year 2023, I was appointed Scientific Director of the Mohammed VI Center for Research and Innovation in Rabat. My research topics are related to the study of the immune response in the context of cancer, especially in glioma and breast cancer.

Languages: Arabic, English and French.

Research ID and Scores: orcid: 0000-0003-4849-9085; Scopus H-index: 19; Scopus: 44 documents.

B. Positions and Employment

From Oct 2023 **General Director,** Mohammed VI Center for Research and Innovation, Rabat, Morocco
Nov 2022 - Oct 2023 **Scientific Director**, Mohammed VI Center for Research and Innovation, Rabat, Morocco
2018 - present **Professor of Immunology**, Faculty of Medicine and Pharmacy, Casablanca, Morocco
2014 - present **Visiting Professor**, University Mohamed VI for health Sciences, Casablanca, Morocco
2014 - 2018 **Qualified Professor**, Faculty of Medicine and Pharmacy, Casablanca, Morocco
2012 - 2014 **Qualified Professor,** Cadi Ayyad University, Safi, Morocco
2007 - 2012 **Assistant Professor,** Cadi Ayyad University, Polydisciplinary Faculty, Safi, Morocco

2005 – 2007 **Associate research scientist,** Yale University, Connecticut, USA

C. Professional Memberships and invitation as examiner

2023 Deputy Editor-in-Chief of the journal "Health Sciences".
2014 - present Invitations to serve as examiner in PhD thesis evaluation.
2014 - present Invitations to serve as examiner for grant applications.
2013 - present Invitations to serve as examiner in Assistant Professors' recruiting in different Universities.
2011 - 2013 Elected member of the council of the Polydisciplinary Faculty of Safi (FPS).
2010 - 2014 Deputy director of the "Environment and Health" research team at the FPS.
2009 - 2013 Pedagogical coordinator of the SVI section at the FPS.
2007 - 2014 Member of the scientific council of the Natural sciences department at the FPS.
2007 - present Co-founding member of the Moroccan Society of Immunology (SMI).
2011 - present Secretary General of the Moroccan Society of Immunology (SMI).
2017 - present Treasurer of the "Federation of African Immunological Societies "FAIS"
2018 - present Member of the Editorial Board of several international journals: BMC Immunology; Molecular Pathology and Biochemistry; Iore Journal of Immunology; Journal of Vaccines, Immunology and Immunopathology; Open Immunology Journal; Clinics in Oncology Research and International Journal of drug design development.

D. Grants and honors

Ongoing grants:

2021 - 2025 Co-recipient, Mo**B**ility for **R**esearch and **A**frican **IN**tegration through Health **S**ciences **"BRAINS",** awarded by the EU, **€ 1 399 800**
2021 - 2023 Principal recipient, Al Khawarizmi program, prediction of precision therapy via artificial intelligence in cancer patients. **€ 200 000**
2021 - 2023 Principal recipient, "Morocco-Tunisia partnership", Cancer immunotherapeutic through selected natural molecules, **€ 30 000**
2019 - 2022 Principal recipient, PPR research grant from the "Moroccan ministry of research", "Bio-engineering of nanobodies for immunotherapy of cancer", **$ 310 000**

Awards and honors:

2003-2004 Polard Memorial Fellowship Award of the Arthritis National Research Foundation.
2020 Certificate of appreciation awarded by the National Radio and Television Company for active participation during COVID-19 pandemic.
Since 2020 Invitations, as researcher in Immunology, by the media (radio, television and newspapers).

Past grants:

- **Grant Erasmus Mundus Action 2,** Lot Fatima AL FIHRI lot 1 2014
- **Research Grant** from « Boehringer Ingelheim Pharmaceuticals, Inc » 2005-2007
- **Research Grant** from « Arthritis National Research Foundation» 2003-2004
- **Postdoctoral Fellowship** from « Fondation pour la Recherche Medicale » 1999-2000
- **Postdoctoral Fellowship** from « SIDACTION (ensemble contre le SIDA) » 1998-1999
- **Doctoral Fellowship** from « Fondation pour la Recherche Médicale » 1997-1998
- **Doctoral Fellowship** from « Association de la recherche pour le cancer » 1996-1997

E. Contribution to Science.

- Mechanisms of HgCl2-induced Th2 lymphocyte activation and autoimmunity.

Mercuric chloride (HgCl2) induces T helper 2 (Th2) autoreactive anti-class II T cells. These cells produce interleukin (IL)-4 and induce a B cell polyclonal activation, which is responsible for autoimmune disease. HgCl2 triggers early IL-4 mRNA expression both in vivo and in vitro by T cells, which may explain why autoreactive anti-class II T cells acquire a Th2 phenotype. We have contributed to understanding transduction pathways by which this chemical operates. We have shown a series of evidence for the involvement of Cav1 channels in

this process. Furthermore, we have shown that Cav1 channels might also be involved in the TCR-mediated T lymphocyte activation. However, at this stage, we have used mainly inhibitory chemicals.

1- **Badou A**, Savignac M, Moreau M, Leclerc C, Foucras G, Cassar G, Paulet P, Lagrange D, Druet P, Guery JC, Pelletier L. Weak TCR stimulation induces a calcium signal that triggers IL-4 synthesis, stronger TCR stimulation induces MAP kinases that control IFN-gamma production. **Eur. J. Immunol**. 2001 Aug;31(8):2487-96.
2- Savignac M, **Badou A**, Delmas C, Subra JF, Cramer SD, Paulet P, Cassar G, Druet P, Saoudi A, Pelletier L. Gold is a T cell polyclonal activator in BN and LEW rats but favors IL-4 expression only in autoimmune prone BN rats. **Eur J Immunol**. 2001 Aug;31(8):2266-76.
3- **Badou A**, Savignac M, Moreau M, Leclerc C, Guery JC, Paulet P, Druet P, Ragab-Thomas J, Pelletier L. Protein kinase C-mediated calcium entry dependent upon dihydropyridine sensitive channels: a T cell receptor-coupled signaling pathway involved in IL-4 synthesis. **FASEB J**. 2001 Jul;15(9):1577-9.
4- **Badou A**, Savignac M, Moreau M, Leclerc C, Pasquier R, Druet P, Pelletier L. HgCl2-induced interleukin-4 gene expression in T cells involves a protein kinase C-dependent calcium influx through L-type calcium channels. **J. Biol. Chem**. 1997 Dec 19;272(51):32411-8.

5- Bridoux F, **Badou A**, Saoudi A, Bernard I, Druet E, Pasquier R, Druet P, Pelletier L. Transforming growth factor beta (TGF-beta)-dependent inhibition of T helper cell 2 (Th2)-induced autoimmunity by self-major histocompatibility complex (MHC) class II-specific, regulatory CD4(+) T cell lines. **J. Exp. Med**. 1997 May 19;185(10):1769-75.

- Genetic evidence for Cav1 channel role in T lymphocyte activation and pathogenesis.

We have studied how T-cells are activated and could be implicated in pathologies such as autoimmune diseases. We have identified, using genetic approaches, specific proteins, Cav 1, responsible for causing cytokine release. We defined the role of each class of Cav1 channels in T-cell function. Selectively blocking one class of Cav1 channels would only partially alter the calcium response, inhibiting the activation of cells with limited side effects. We worked to block the activation step, i.e. blocking specifically the involved calcium channel, thereby paving the way at the discovery of new T-cell activation targeting drugs.

1- **Badou A**, Jha MK, Matza D, Flavell RA. Emerging roles of L-type voltage-gated and other calcium channels in T lymphocytes. **Front Immunol**. 2013 Aug 30;4:243.
2- Mithilesh K. Jha, **Abdallah Badou**, Veit Flockerzi, Marc Freichel, and Richard A. Flavell. Defective Survival and Function of Naïve $CD8^+$ T Lymphocytes in the absence of $\beta 3$ regulatory subunit of Ca_v channels. **Nature Immunology**. 2009 Dec;10(12):1275-82. Epub 2009 Oct 18.
3- Matza D, **Badou A**, Jha MK, Willinger T, Antov A, Sanjabi S, Kobayashi KS, Marchesi VT, Flavell RA. Requirement for AHNAK1-mediated calcium signaling during T lymphocyte cytolysis. **PNAS**. 2009 Jun 16;106(24):9785-90. Epub 2009 Jun 2.
4- Didi Matza*, **Abdallah Badou***, Koichi S. Kobayashi, Karen Goldsmith-Pestana, Yutaka Masuda, Akihiko Komuro, Diane McMahon-Pratt, Vincent T. Marchesi and Richard A. Flavell. A Scaffold Protein, AHNAK, Is Required for Calcium Signaling during T Cell Activation. **Immunity**. 2008 Jan; 28: 64-74. ***equal contribution.**
5- **Abdallah Badou**, Mithilesh K. Jha, Didi Matza, Wajahat Z. Mehal, Marc Freichel, Veit Flockerzi and Richard A. Flavell. Critical role for the beta regulatory subunits of Cav channels in T lymphocyte function. **PNAS*.*** 2006 Oct ; 103: 15529-34.

- Study of the immune response in cancer: Identification of novel therapeutic drugs.

My current research topics focus on tumor immunology. We seek to evaluate the immune response in patients presenting with cancer (breast and gliomas) in order to identify targets within the immune cells that could be used to boost the anti-tumor immune response. We combine bioinformatics, real time-PCR, IHC and flow cytometry approaches. We have established collaborations with surgeons, oncologists, mathematicians and computer scientists. Ultimately, we aim at identifying novel drugs, with limited side effects.

1- Zohair B, Chraa D, Rezouki I, Benthami H, Razzouki I, Elkarroumi M, Olive D, Karkouri M, **Badou A**. The immune checkpoint adenosine 2A receptor is associated with aggressive clinical outcomes and reflects an immunosuppressive tumor microenvironment in human breast cancer. **Front Immunol**. 2023 Sep 11;14:1201632.

2- Issam Salah NEI, Marnissi F, Lakhdar A, Karkouri M, ElBelhadji M, **Badou A**. The immune checkpoint VISTA is associated with prognosis in patients with malignant uveal melanoma. **Front Immunol**. 2023 Aug 18;14:1225140.
3- Miftah H, Naji O, Ssi SA, Ghouzlani A, Lakhdar A, **Badou A**. NR2F6, a new immune checkpoint that acts as a potential biomarker of immunosuppression and contributes to poor clinical outcome in human glioma. **Front Immunol**. 2023 Jul 28;14:1139268.
4- Rafii S, Kandoussi S, Ghouzlani A, Naji O, Reddy KP, Ullah Sadiqi R, **Badou A**. Deciphering immune microenvironment and cell evasion mechanisms in human gliomas. **Front Oncol**. 2023 May 19;13:1135430. doi: 10.3389/fonc.2023.1135430.
5- Boulhen C, Ait Ssi S, Benthami H, Razzouki I, Lakhdar A, Karkouri M, **Badou A**. TMIGD2 as a potential therapeutic target in glioma patients. **Front Immunol**. 2023 May 16;14:1173518.
6- Rezouki I, Zohair B, Ssi SA, Karkouri M, Razzouki I, Elkarroumi M, **Badou A**. High VISTA expression is linked to a potent epithelial-mesenchymal transition and is positively correlated with PD1 in breast cancer. **Front Oncol**. 2023 Apr 20;13:1154631.
7- Rafii S, Ghouzlani A, Naji O, Ait Ssi S, Kandoussi S, Lakhdar A, **Badou A**. $A_{2A}R$ as a Prognostic Marker and a Potential Immunotherapy Target in Human Glioma. **Int J Mol Sci**. 2023 Apr 3;24(7):6688.
8- Kone AS, Ait Ssi S, Sahraoui S, **Badou A.** BTN3A: A Promising Immune Checkpoint for Cancer Prognosis and Treatment. **Int J Mol Sci**. 2022 Nov 3;23(21):13424.
9- Ghouzlani A, Lakhdar A, Rafii S, Karkouri M, **Badou A.** The immune checkpoint VISTA exhibits high expression levels in human gliomas and associates with a poor prognosis. **Sci Rep**. 2021 Nov 2;11(1):21504.
10- Ait Ssi S, Chraa D, El Azhary K, Sahraoui S, Olive D, **Badou A.** Prognostic Gene Expression Signature in Patients With Distinct Glioma Grades. **Front Immunol**. 2021 Sep 1;12:685213.
11- Ghouzlani A, Kandoussi S, Tall M, Reddy KP, Rafii S, **Badou A.** Immune Checkpoint Inhibitors in Human Glioma Microenvironment. **Front Immunol**. 2021 Jul 9;12:679425.
12- Ghouzlani A, Rafii S, Karkouri M, Lakhdar A, **Badou A.** The Promising IgSF11 Immune Checkpoint Is Highly Expressed in Advanced Human Gliomas and Associates to Poor Prognosis. **Front Oncol**. 2021 Feb 2;10:608609.

Students training activities (2007 to 2019):
Interns/BSc, Master II, PhD students, Post-doc training and Medical international students.