Curriculum vitae

Family name: **BOMSEL** **First Name**: **Morgane**
Nationality: French **Children**: one child

Laboratory address: Mucosal Entry of HIV and Mucosal Immunity, Institut Cochin
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Education

1983-1985: University of PARIS (Paris VI), **Thèse de Doctorat** en Biophysique (PhD)
1987-1990: EMBL, Heidelberg, Germany **Post doctorate,** (K. Simon, J Gruenberg)
1990- 1992: University of California, San Francisco, USA, **Post doctorate,**.(K. Mostov)

Positions

1988 Research assistant at the National Center for Scientific Research (CR2, then CR1 CNRS)
1998 Research Director class 2 at the National Center for Scientific Research (DR2, CNRS)
2011-on going **Research Director class 1 at the National Center for Scientific Research (DR1, CNRS)**

1993-on going **Group leader, Institut Cochin (INSERM: U1016, CNRS: UMR 8104, Université Paris Cité)**

Awards

April 1992: Nominated as "Young Europe's Rising Star" by the Science's Board Science ,1992, 256, 471.
April 1993: Price BNP- FRM for "TCD4+ lymphocytes apoptosis mediated HIV".
July 1995 Promising Young Scientist Award, ESHRE Meeting, Maastrich.
May 1997 First Young Scientist Award, European Conference on Experimental AIDS, Stockholm, Sweden
March 1998 First Young Scientist Award, European Conference on Experimental AIDS, Munich, Germany
Nov. 2016 Prix Jaffé from the French National Academy of Sciences
Nov. 2020: Prix Line Renaud-Loulou Gasté, Fondation pour la Recherche Médicale

Honors

July 2016 Knight of the Legion of Honour

Grants

• **National***: Public agencies* : Agence national de recherche sur le SIDA les Hepatites et les maladies emergentes (ANRS mie) regularly since 1994, Agence national pour la recherche (ANR), SATT-Île de France/Erganeo, DIM One Health. *NGOs* : SIDACTION, Fondation pour la Recherche Médicale (FRM) - Equipe FRM.

• **International:** European community (FP5 and FP7)

Translational research and Valorisation :

• **12 Patent deposited** with 3 in 2020-21, **License development:** INSERM Transfert with the biothech Mymetics.
• **Partnership contract:** INSERM Transfert/INSERM U1016 – Mymetics

Domains of expertise

Cell biology, Membrane traffic, Membrane dynamic, Mucosal biology, Mucosal immunology, Virology, especially HIV, HSV and SARSCoV-2 ;

Domains of application :

Basic science, Therapeutics research on HIV, HSV and SARS-CoV2, mucosal vaccines and virus microbicides.

After a PhD in Biophysics, I investigated the **cell biology of mucosal tissue and mucosal antibody trafficking**. The **my lab** now focuses its research on the mucosal/sexual transmission of HIV and HSV aiming at understanding the transmission mechanisms a cellular and molecular levels, the protective mucosal immunity against this virus and how HIV persist in mucosal tissues, hampering HIV eradication. As SARS-CoV-2 target also mucosal tissue, we translated our expertise on mucosal HIV to this poorly known disease. Our approach lies at the interface of several fundamental field including immunology, virology and biophysics, with a perspective, when appropriate, of

translational research. This work was and remains only possible through national and international collaborations. Our main discovery were:

- The pioneering description at cellular and molecular levels of how the human deficiency virus (HIV) invades the genital mucosa using **transcytosis as one key mechanism of HIV entry at mucosal site**.
- By deciphering the early events of mucosal (sexual) transmission of HIV, the genital IgA antibody response in HIV resistant individuals, namely HIV-1 exposed but IgG seronegative subjects, we **develop a prophylactic mucosal vaccine against HIV-1 targeting HIV-1 envelope gp41. This vaccine was tested with success in preclinical and human clinical phase studies.** A clinical phase II is in preparation.
- The characterization of the protective role of **neuropeptides, secreted by peripheral neurones in all these mucosa, against mucosal infection of HIV but also of herpes simplex virus (HSV)**.
- The mechanism of **transmission in the human male genital tract** targeting Langerhans cells in the foreskin and tissue macrophages in the urethra.
- The presence of **two new types of replication-competent HIV reservoirs *in vivo,* namely** in **tissue macrophages** and **bone marrow megakaryocytes**, and the role of HIV-infected platelets I connecting these reservoirs. These cell reservoirs are a major barrier to HIV cure and can now be targeted.
- During the **COVID-19 pandemic**, we defined **fatality markers** at the lung level, namely infectious SARS-CoV-2 in platelets produced lung megakaryocytes and high level of lung non-neutralizing SARS-COV-2 specific IgA. As a follow-up, the description of SARS-CoV-2 reservoirs in Long COVID is on going.

Supervision: 17 PhD students and 20 post doctoral fellows, 9 Scientists

Current lab members : 4 scientists, 4 PhD students, 2 post docs, Master students

Main recent publications among 110 total (orcid.org/0000-0002-9577-7474)

- Real, F, Zhu A, Huang, B, Belmellat, A, Sennepin, A, Vogl, T, Ransy C Revol, M, Arrigucci, R, Lombès, A, Roth, J, Gennaro ML, Bouillaud, F, Cristofari, S, **Bomsel, M**. S100A8-mediated metabolic adaptation controls HIV-1 persistence 1 in macrophages in vivo. ***Nat Comm*** (2022) 13:5956. doi: 10.1038/s41467-022-33401-x
- Zhu A; Real R; Capron C; Rosenberg A; Zhu J; Cottignies-Calamarte A; Massé JM; Moine P; Bessis S; Godement M; Geri G; Chiche JD; Valdebenito S; Belouzard S; Dubuisson J; Lorin de la Grandmaison G; Eugenin E; Chevret S; Annane D; Cramer-Bordé E; **Bomsel M.** 2021, Platelets carry infectious SARS-CoV-2 in fatal COVID-19, ***Cell Mol Life Science*** 2022 Jun 16;79(7):365. doi: 10.1007/s00018-022-04318-x
- Real, F, Capron, C, Sennepin, A, Arrigucci R, Sannier, G, Zhu A, Zheng J, Xu L, Massé, JM, Greffe, S, Eugenin, E, Gennaro ML, Rouveix, E, Cramer-Bordé, E and **Bomsel, M.** Platelets from HIV-infected individuals on antiretroviral drug therapy with low CD4+T cell recovery can harbor infectious viruses despite viral suppression 2020, ***Sci. Transl. Med***. **12**, eaat6263 18 March 2020 doi : 10.1126/scitranslmed.aat6263
- Ganor, Y, Real, F., Sennepin, A, Dutertre, CA, Marion, S, Zenak, AR, Zhou, ZC, , Capron, C, Jourdain, JP, Schmitt, A, Cheynier R, Revol, M, Eugenin, E Cristofari S, Hosmalin A, **Bomsel M.** HIV-1 reservoirs in urethral macrophages of patients under suppressive antiretroviral therapy, ***Nat. Microbiol.*** 2019, doi: 10.1038/s41564-018-0335-z
- Ganor Y, Drillet-Dangeard AS, Lopalco L, Tudor D, Tambussi G, Delongchamps NB, Zerbib M, **Bomsel M**. Calcitonin gene-related peptide inhibits Langerhans cell-mediated HIV-1 transmission. ***J Exp Med.*** 2013 Oct 21;210(11):2161-70. doi: 10.1084/jem.20122349.
- Tudor, D., H. Yu, Maupetit, J., Drillet, A.S., Bouceba, T., Schwartz-Cornill, I, Lopalco, L., Tuffery, P., **Bomsel, M**. Isotype modulates epitope specificity, affinity and the antiviral activities of the anti-HIV human broadly neutralizing 2F5 antibody, ***Proc. Natl. Acad. Sci.*** USA, 2012, 109: 12680-5. doi: 10.1073/pnas.1200024109.
- **Bomsel M*** (*corresponding author and lead),, Tudor D, Drillet As, Alfsen A, Ganor Y, Roger Mg, Mouz N, Amacker, M Chalifour A, Diomede L, Devillier G, Cong Z, Wei Q, Gao H, Qin C, Yang G, Zurbriggen R, Lopalco L, Fleury S. Immunization with HIV-1 gp41 Subunit Virosomes Induces Mucosal Antibodies Protecting Nonhuman Primates against Vaginal SHIV Challenges. ***Immunity,*** 2011 34: p. 269-80. doi: 10.1016/j.immuni.2011.01.015.
- Bomsel, M. and A. Alfsen, Entry of viruses through the epithelial barrier: pathogenic trickery. ***Nat Rev Mol Cell Biol***, 2003. 4: p. 57-68. doi: 10.1038/nrm1005
- **Bomsel M*** (*corresponding author and lead), Heyman M, Hocini H, Lagaye S, Belec L, Dupont C, Desgranges C. Intracellular neutralization of HIV transcytosis across tight epithelial barriers by anti-HIV envelope protein dIgA or IgM. ***Immunity***. 1998 Aug;9(2):277-87. doi: 10.1016/s1074-7613(00)80610-x
- **Bomsel M**. Transcytosis of infectious human immunodeficiency virus across a tight human epithelial cell line barrier ***Nat Med.*** 1997 Jan;3(1):42-7. doi: 10.1038/nm0197-42.
- **Bomsel M**, Parton R, Kuznetsov SA, Schroer TA, Gruenberg J. Microtubule- and motor-dependent fusion in vitro between apical and basolateral endocytic vesicles from MDCK cells. ***Cell.*** 1990 Aug 24;62(4):719-31. doi: 10.1016/0092-8674(90)90117-w.