Laboratory Name	Molecular Biology Lab	
Main Goals	Our group develops research on HIV-2 infectivity, new breast cancer therapeutic and also the biocompatibility of dental materials and genetic polymorphisms. The laboratory work surrounds exploring the different aspects of HIV-2 infections, explaining the importance of VIF (Virion infectivity factor) to avoid cancer progression and resistance to chemotherapy, and developing cytotoxicity studies using several dental materials, which is being done with Master's students. Also with students we analyze genetic polymorphisms in the genes coding for detoxification enzymes in different populations.	

Lab Head	Isabel Barahona, PhD
Group	Ana Clara Guerreiro de Oliveira Ribeiro (PhD) Evguenia Pavlovna Bekman (PhD) Maria Alexandra Taquenho Maia e Silva (PhD) Maria Madalena Seabra de Oliveira Salema Cordeiro Oom (PhD) Susana Isabel Casaca Figueiredo Bandarra (PhD student) Paulo Sobral Mascarenhas (MsC) Rita Mendes de Almeida (fellowship of the project PTDC/BIMMEC/6631/2014) Sílvia Simões (MsC) Joana Neves (MsC)

	Mariana Avelar (MsC) Flávia Neto (MsC) Nuno Santos (Master Student) Alina Moscovciuc (Student) Diogo Arruda (Master Student) Rita Rodrigues (Student) Rodrigo Fernandes (Student) Nádia Brito (Student)
Senior Researchers	Ana Clara Guerreiro de Oliveira Ribeiro (PhD) Evguenia Pavlovna Bekman (PhD) Maria Alexandra Taquenho Maia e Silva (PhD) Maria Madalena Seabra de Oliveira Salema Cordeiro Oom (PhD)
PhD Students	Susana Isabel Casaca Figueiredo Bandarra

Research Projects (from 2013)	1- **Searching APOBEC protein responsible for inhibition of HIV-2 vif deficient virus** Our laboratory studies Human Immunodeficiency virus type 2, HIV-2, and we are mainly interested to understand why HIV-2 is less infectious than HIV-1. We have characterized the Viral Infectivity Factor from HIV-2, Vif2, which is a viral protein essential for the production of infectious viruses, mainly because, induces APOBEC3 degradation. Human cells have developed several strategies to avoid lentiviral infectious, including the production of APOBEC3, a family of deaminases that induces mutations in viral genome resulting in non-infectious viral particles. The viral protein Vif counteracts the anti-retroviral cellular APOBEC3 by inducing its degradation in proteasomes. Our previous HIV-2 studies showed that viral inhibition by APOBEC3G is less efficient against HIV-2 than HIV-1 (Ribeiro et al. 2005). Our working hypothesis is that the lower HIV-2 infectivity compared with HIV-1 infectivity reflects differences in APOBEC3 / Vif interactions and

therefore we are studying the effect of the different members of the APOBEC3 family in the HIV-2 and HIV-1 infectivity.

Our results will lead to a better understanding of HIV-2 infection mechanisms essential to design new anti-retroviral drugs, using Vif/APOBEC3 interaction as a novel target.

2- "**Breast cancer therapeutics with Vif**" PTDC/BIM-MEC/6631/2014 financed by Fundação para a Ciência e Tecnologia, Portugal and Egas Moniz, CRL.

After 2012, it was verified that many cancer cells have a mutational signature related to APOBEC3 cytidine deaminase activity, responsible for induction of many somatic mutations present in transformed cells. In the case of the breast cancer cells, they overexpress APOBEC3B.

We developed the hypothesis that VIF would be useful to inhibit APOBEC3 overexpressed in cancer cells, which is particularly important for breast cancer with metastases, in which there is resistance to chemotherapy treatment and therefore there is no cure.

We are producing new breast cancer cell lines that express viral proteins, namely VIF2 and VIF1 that inactivate APOBEC3 to prove the relation between APOBEC3 inactivation and decrease in resistance to chemotherapy

Our work will show the importance of the protein VIF (Virion infectivity factor) as a therapeutic tool in cancer progression and resistance to chemotherapy. Moreover, it will confirm the importance of APOBEC3 activity in the cellular mechanisms of DNA repair, and resistance to chemotherapy. Ultimately, it will push toward the development of new drugs using VIF as a model to bind to APOBEC3 that can cure metastasized breast cancer and hopefully be used widely in all cancers that overexpress APOBEC3**.**

3- **Biocompatibilidade** : Citotoxicidade Genotoxicidade
Materiais Dentários Adesão

Any material in contact with cells causes an effect that can be toxic. In dentistry are used many materials for treatment or replacement of teeth.

	The physical and chemical properties of these materials are well studied in materials marketed but often the biocompatibility aspects are neglected. In our laboratory we study the cytotoxic and genotoxic effects as well as the ability of adhesion and differentiation of various materials used in the clinic and others being developed by other groups. 4- **Genetic polymorphisms : Pharmacogenetics and correlation with pathologies** A number of relevant genetic polymorphisms, particularly in metabolizing enzyme phase I and II and transport proteins are known to affect the response to therapy, leading to drug toxicity which may explain the interpatient variability for drug absorption pathways. In our lab we perform identification and characterization of these polymorphisms in order to set in the patient's genetic information which is important to avoid toxicity levels and improve patient compliance to treatment. Moreover, the presence of polymorphic variants in certain genes varies the risk of development of certain pathologies. The knowledge of these variants can contribute to the molecular characterization of the pathology and prevent its development (eg: cancer, osteoporosis, diabetes).
Publications (10 most relevant, last 5 years)	• Borrego P, Gonçalves MF, Gomes P, Araújo L, Moranguinho I, Figueiredo IB, Barahona I, Rocha J, Mendonça C, Cruz MC, Barreto J, Taveira N 2017 "Assessment of the Cavidi ExaVir™ Load assay for monitoring plasma viral load in HIV-2 infected patients" J Clin Microbiol 55 (8):2367–2379. doi: 10.1128/JCM.00235-17. • Duarte H, Cruz JP, Aniceto N, Ribeiro AC, Fernandes A, Paixão P, Antunes F, Morais J 2017 "Population Approach to Efavirenz Therapy". Journal of Pharmaceutical Sciences Vol. 106, Issue 10, 3161-3166 • Arriaga, P., Adrião, J., Madeira, F., Cavaleiro, I., Maia e Silva, A., Barahona, I., Esteves, F. (2015) "A "Dry Eye" for Victims of Violence: Effects of Playing a Violent Video Game on Pupillary Dilation to Victims and on Aggressive Behavior", Psychology of Violence, 5 (2), 199-208. doi: 10.1037/a0037260

- Mascarenhas, P., Fatela B. and Barahonal. (2014) Effect of Diabetes Mellitus Type 2 on Salivary Glucose – A Systematic Review and Meta-Analysis of Observational Studies, PLoS ONE 9(7): e101706. doi:10.1371/journal.pone.0101706
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- Neves J, Avelar M, Bandarra S, Ribeiro AC, Mascarenhas P, Bekman E and Barahona I; "Determination of median lethal dose of three Bulk-fill resin composites". (2018) Translational Research and Innovation in Human and Health Science, Annals of Medicine, 50:sup1, S10-S170, DOI: 10.1080/07853890.2018.1427445
- Mascarenhas P., Vagish Kumar L.S. , Cortelli, J.R. , Cortelli S.C. , Bandarra S., Bekman, E., Ribeiro A.C., Barahona I., “Cross-validation and quality assessment of a prediction model based on salivary glucose for early screening of type 2 diabetes mellitus”. (2018) Translational Research and Innovation in Human and Health Science, Annals of Medicine, 50:sup1, S10-S170, DOI: 10.1080/07853890.2018.1427445
- Simões SA, Bandarra S, Bekman E, Ribeiro AC, Proença L, Azul AM and Barahona I; (2017)"Cytotoxic comparison of 2 Bulk Fill Resin-Composites". *Annual Meeting of the IADR Continental European Division (CED)*, September, Vienna, Austria.
- Bandarra S, Ribeiro AC, Bekman E, Mascarenhas P, Gomes P, Gonçalves J and Barahona I.(2017) "Regulation of HIV-2 and

	HIV-1 production by APOBEC3". Retroviruses Annual Meeting, CSHL Meetings, May, USA. • Diniz AR[1], Borrego P[1], Gomes P[2,5], Gonçalves F[2], Caixas U[3], Vaz Pinto I[4], Barahona, I[5], Bártolo I[1], Taveira (2017) Dolutegravir has a highly potent activity against most primary HIV-2 isolates including those that are resistant to raltegravir, presented in "innovation week", Lisbon University, 3-9 May.

Equipment/Techniques	**Cell culture room** **Equipment:** Vertical laminar flow, class II, CO2 incubator, refrigerate centrifuge, inverted microscope, water-bath and automatic pipettes. We cultivate different cell lines, and perform transfection, transduction and infections using plasmids and viruses. **Molecular Biology Laboratory** **Equipment**: Ultra-centrifuge BECKMAN LE-80, refrigerated centrifuge and non-refrigerated centrifuges, PCR and Real-time PCR, several horizontal and vertical apparatus for DNA and proteins electrophoresis, trans-blot systems, several power supplies, Gel Doc XR System + PD Quest+ filters, gel drying apparatus, orbital incubator, Vertical laminar flow , balances, pH meters, magnetic stirrers with heating , sterilization and drying ovens, vortexes, several fridges, and computers. We perform basic genetic engineering techniques namely extraction of nucleic acids from different biological materials, cloning of genes, amplification of DNA and cDNA by PCR and RT-PCR. We perform electrophoretic analysis of DNA, RNA and proteins (Southern, Northern and Western analysis). We also perform cytotoxicity assays (MTT , cristal violet and blue tripan) and genotoxicity assays (micronuclei assays).
Announcements	

Some Pictures	
Location	
Links	http://ciiem.egasmoniz.edu.pt/pt-pt/research/research-labs.aspx