BIOGRAPHICAL SKETCH

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NAME: Carrasco-Yépez, María Maricela

eRA COMMONS USERNAME (credential, e.g., agency login):…

POSITION TITLE: Full-time professor (Level A)

EDUCATION/TRAINING

| INSTITUTION AND LOCATION | DEGREE | Completion Date | FIELD OF STUDY |
| --- | --- | --- | --- |
| School of Higher Studies Iztacala of the National Autonomous University of Mexico | BS | 09/2006 | Cell Biology |
| National School of Biological Sciences of the National Polytechnic InstituteHigher School of Medicine of the National Polytechnic Institute | MSPHD | 03/200910/2013 | ImmunologyBiomedicine  |
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**A. Personal Statement**

**Particularly, my interest in the area of the free living amoebas began in my Bachelor’s project thesis focused mainly in the immune response against Naegleria fowleri meningoencephalitis in mice. Here, we evaluated some proteins such as antibodies and cytokines demonstrating their importance for resistance to *N. fowleri* infection. Consequently, my current area of interest has been focused in the characterization of some factors associated to the immune response and the protein interactions of Naegleria fowleri with the host cells in experimental model of mice. We are searching specific antigenic determinants (by molecular, proteomic or bioinformatics tools) responsible for the pathogenicity and immunogenicity of N. fowleri with the aim of proposing therapeutic targets for the design of vaccines against the meningoencephalitis due to *N. fowleri.***

**I am professor Titular ‘A’ (equivalent to Full Professor, level “A”), at Faculty of Higher Studies Iztacala of the National Autonomous University of Mexico (FES-Iztacala, UNAM). Currently, I have the category in the incentive program of UNAM (PRIDE level C). In addition, I am member of the Sistema Nacional de Investigadores (SNI) since January, 2014 (Level 1). Researchers who are recognized nationally for their contributions to science.**

**I have contributed to the training and academic development of students where I have served as thesis director of students at both the undergraduate (biology and nursing students) and graduate levels (MS and PHD). I have also directed students interested in conducting their social service in free-living amoebas area, especially in the identification of Naegleria spp. by molecular characterization. At the present time, I have a posdoc scholar working with extracellular vesicles from Naegleria fowleri. As a faculty member, I am the current supervisor of the CyMA group where I belong, I have also participated as a member of the Ethics Committee representing the Research and Postgraduate Department from 2016 to 2021.**

**I have obtained financial resources for 4 projects supported by UNAM-PAPIIT (2014-Present) and a project supported by the Mexican National Council of Science and Technology (CONACYT).**

**B. Positions, Scientific Appointments, and Honors**

 **Positions and scientific appointments**

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| **June 2018 – Present** | **Full-Time Professor Titular Level "A". Assignment to the Research and Postgraduate Division. GICyMA.** School of Higher Studies Iztacala of the National Autonomous University of Mexico |
| **April 2014 – May 2018** | **Full-Time Professor Associate Level “C”.** Assignment to the Research and Postgraduate Division. GICyMA. School of Higher Studies Iztacala of the National Autonomous University of Mexico |
| **October 2012 – March 2014** | **Research Assistant Level “B” Assignment to the Research and Postgraduate Division. GICyMA.** School of Higher Studies Iztacala of the National Autonomous University of Mexico |
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**Honors**

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| **January 2014** | Member of the Sistema Nacional de Investigadores (SNI-CONHACYT) |
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**C. Contributions to Science**

**My work focuses on the search of factors associated to the immune response against meningoencephalitis** due to *N. fowleri* as well as the identification of antigenic determinants as immunogenic or virulence factors which could be used as therapeutic targets for the design of vaccines against the disease*.* In addition, I am working on the detection and identification of *N. fowleri* isolates through proteomics and molecular biology. Highlighting the importance as these isolates come from water used for recreational activities by people.

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| --- |
| 1. Gutiérrez-Sánchez M, **Carrasco-Yépez MM**, Correa-Basurto J, Ramírez-Salinas GL, Rojas-Hernández S. Two MP2CL5 Antigen Vaccines from Naegleria fowleri Stimulate the Immune Response against Meningitis in the BALB/c Model. Infect Immun. 2023 Jul 18;91(7):e0018123. doi: 10.1128/iai.00181-23. Epub 2023 Jun 5. PMID: 37272791; PMCID: PMC10353451.
2. Rojas-Ortega DA, Rojas-Hernández S, Sánchez-Mendoza ME, Gómez-López M, Sánchez-Camacho JV, Rosales-Cruz E, **Yépez MMC**. Role of FcγRIII in the nasal cavity of BALB/c mice in the primary amebic meningoencephalitis protection model. Parasitol Res. 2023 May;122(5):1087-1105. doi: 10.1007/s00436-023-07810-w. Epub 2023 Mar 13. PMID: 36913025; PMCID: PMC10009362.
3. Role of cathepsin B of Naegleria fowleri during primary amebic meningoencephalitis. Rodríguez- Mera IB, **Carrasco-Yépez MM**, Vásquez-Moctezuma I, Correa-Basurto J, Salinas GR, Castillo-Ramírez DA, Rosales-Cruz É, Rojas-Hernández S. Parasitol Res. 2022 Nov;121(11):3287-3303. doi: 10.1007s00436-022-07660-y. Epub 2022 Sep 20. PMID: 36125528.
4. A 250-kDa glycoprotein of Naegleria fowleri induces protection and modifies the expression of α4β1 and LFA-1 on T and B lymphocytes in mouse meningitis model. Castillo-Ramírez DA, **Carrasco- Yépez MM**, Rodríguez-Mera IB, Reséndiz-Albor AA, Rosales-Cruz É, Rojas-Hernández S. Parasite Immunol. 2021 Dec;43(12):e12882. doi: 10.1111pim.12882. Epub 2021 Oct 11. PMID: 34570374.
5. Identification of differential protein recognition pattern between Naegleria fowleri and Naegleria lovaniensis. Gutiérrez-Sánchez **M, Carrasco-Yepez MM**, Herrera-Díaz J, Rojas-Hernández S. Parasite Immunol. 2020 Jun;42(6):e12715. doi: 10.1111pim.12715. Epub 2020 Apr 28. PMID: 32191816.
6. Identification of Immunogenic Antigens of Naegleria fowleri Adjuvanted by Cholera Toxin. Rojas- Hernández S, Gutiérrez-Sánchez M, Rojas-Ortega DA, Bonilla-Lemus P, Contis-Montes de Oca A, Herrera-Díaz J, López-Reyes I, **Carrasco-Yépez MM**. Pathogens. 2020 Jun 10;9(6):460. doi: 10.3390pathogens9060460. PMID: 32531943.
7. Isolation and Identification of Naegleria Species in Irrigation Channels for Recreational Use in Mexicali Valley, Mexico. Bonilla-Lemus P, Rojas-Hernández S, Ramírez-Flores E, Castillo-Ramírez DA, Monsalvo-Reyes AC, Ramírez-Flores MA, Barrón-Graciano K, Reyes-Batlle M, Lorenzo-Morales J, **Carrasco-Yépez MM**. Pathogens. 2020 Oct 7;9(10):820. doi: 10.3390pathogens9100820. PMID: 33036396.
8. Mouse neutrophils release extracellular traps in response to Naegleria fowleri. **Carrasco-Yepez MM**, Contis-Montes de Oca A, Campos-Rodriguez R, Falcon-Acosta D, Pacheco-Yepez J, Rodriguez- Mera IB, Bonilla-Lemus P, Rosales-Cruz E, Lopez-Reyes I, Rojas-Hernandez S. Parasite Immunol. 2019 Feb;41(2):e12610. doi: 10.1111pim.12610. Epub 2019 Jan 9. PMID: 30525201.
9. **Carrasco-Yepez MM**, Campos-Rodriguez R, Resendiz-Albor AA, Pena-Juarez C, Contis-Montes de Oca A, Arciniega-Martinez IM, Bonilla-Lemus P, Rojas-Hernandez S: Naegleria fowleri immunization modifies lymphocytes and APC of nasal mucosa. Parasite immunology 2018, 40(3).
10. Contis-Montes de Oca A**, Carrasco-Yepez M,** Campos-Rodriguez R, Pacheco-Yepez J, Bonilla- Lemus P, Perez-Lopez J, et al. Neutrophils extracellular traps damage Naegleria fowleri trophozoites opsonized with human IgG. Parasite Immunol. 2016;38(8):481-95.
11. **Carrasco-Yepez M,** Campos-Rodriguez R, Lopez-Reyes I, Bonilla-Lemus P, Rodriguez-Cortes AY, Contis-Montes de Oca A, Jarillo-Luna A, Miliar-Garcia A, Rojas-Hernandez S. Intranasal coadministration of Cholera toxin with amoeba lysates modulates the secretion of IgA and IgG antibodies, production of cytokines and expression of pIgR in the nasal cavity of mice in the model of Naegleria fowleri meningoencephalitis. Exp Parasitol. 2014 Nov;145 Suppl:S84-92. doi: 10.1016/j.exppara.2014.04.002. Epub 2014 Apr 13. PMID: 24731967.
12. **Carrasco-Yepez M**, Campos-Rodriguez R, Godinez-Victoria M, Rodriguez-Monroy MA, Jarillo-Luna A, Bonilla-Lemus P, De Oca AC, Rojas-Hernandez S. Naegleria fowleri glycoconjugates with residues of α-D-mannose are involved in adherence of trophozoites to mouse nasal mucosa. Parasitol Res. 2013 Oct;112(10):3615-25. doi: 10.1007/s00436-013-3549-2. Epub 2013 Aug 7. PMID: 23922203.
13. **Carrasco-Yepez M**, Rojas-Hernandez S, Rodriguez-Monroy MA, Terrazas LI, Moreno-Fierros L. Protection against Naegleria fowleri infection in mice immunized with Cry1Ac plus amoebic lysates is dependent on the STAT6 Th2 response. Parasite Immunol. 2010 Sep-Oct;32(9-10):664-70. doi: 10.1111/j.1365-3024.2010.01222.x. PMID: 20691018.
14. Rojas-Hernández S, Rodríguez-Monroy MA, Moreno-Fierros L, Jarillo-Luna A, **Carrasco-Yepez M,** Miliar-García A, Campos-Rodríguez R. Nitric oxide production and nitric oxide synthase immunoreactivity in Naegleria fowleri. Parasitol Res. 2007 Jul;101(2):269-74. doi: 10.1007/s00436-007-0495-x. Epub 2007 Mar 6. PMID: 17340143.

Working as a collaborator in the analysis of *Taenia crassiceps* antigens as well as in the molecular identification of pathogenic *Acanthamoeba* spp:1. Ramírez-Flores E, Bonilla-Lemus P, **Carrasco-Yépez MM**, Ramírez-Flores MA, Barrón-Graciano KA, Rojas-Hernández S, Reyes-Batlle M, Lorenzo-Morales J. Saline-Tolerant Pathogenic *Acanthamoeba* spp. Isolated from a Geothermal Power Plant. Pathogens. 2023 Nov 17;12(11):1363. doi: 10.3390/pathogens12111363. PMID: 38003827; PMCID: PMC10674709.
2. Montero-Barrera D, Valderrama-Carvajal H, Terrazas CA, Rojas-Hernandez S, Ledesma-Soto Y, Vera-Arias L, **Carrasco-Yépez M**, et al. The macrophage galactose-type lectin-1 (MGL1) recognizes Taenia crassiceps antigens, triggers intracellular signaling, and is critical for resistance to this infection. Biomed Res Int. 2015;2015:615865.
 |

Chapters in specialized books:

1. Alonso Trujillo Javier, Alonso Ricardez Abraham, **Carrasco Yépez Maricela**, Valera Mota Mirna Miriam, Cuevas Guajardo Leticia. Estrategia educativa para mejorar el análisis de datos. Debates En Evaluación y Currículum/Congreso Internacional de Educación: Currículum 2019/ Año 5, Número 5/. ISSN: 2448-6574
2. Alonso Trujullo J. A., Valadez Díasz D., **Carrasco Yépez M** y Guzmán García A.L. 2016. Aprendizaje experiencial al proceso de enseñanza-aprendizaje de Estadística Inferencial. Experiencia Docente. Topics in probability and statistics. Benemérita Universidad Autónoma de Puebla ISBN 978-607-525-083-0.
3. Andrade Miguel A., **Carrasco Ma. Maricela**, Ortíz Ricardo, Ibarra Ma. Rocío, Carmona, Javier y Bonilla Patricia.2015. Amibas de vida libre y potencialmente patógenas de ríos de la Cuenca de México, Tendencias de investigación en Limnología tropical: Perspectivas universitarias en Latinoamérica. Asociación Mexicana de Limnología, A.C., Instituto de Ciencias del Mar y Limnología, UNAM, y Consejo Nacional de Ciencia y Tecnología. México. ISBN 978-607-02-7199-1.

**As a full-time professor,** I have contributed to the training and academic development of students at both the undergraduate and graduate levels: biologists, nursing, MS and PHD students where I have participated as thesis director or co-director

**BACHELOR THESIS (DIRECTOR)**

1. Maribel Laura Aja Pioquinto*. ATTITUDE AND KNOWLEDGE REGARDING ORGAN AND TISSUE DONATION FOR TRANSPLANTATION PURPOSES IN THE NURSING STAFF OF THE GENERAL LAS AMÉRICAS HOSPITAL.* May, 2021
2. Susana Jessica Aja Pioquinto. *ATTITUDE AND KNOWLEDGE REGARDING ORGAN AND TISSUE DONATION FOR TRA*NSPLANTATION PURPOSES IN THE NURSING STAFF OF THE GENERAL LAS AMÉRICAS HOSPITAL. June, 2021
3. JJosselyn Flores Vazquez. *THE SUPPORT NETWORK AS A PSYCHOSOCIAL FACTOR IN ADHERENCE TO PERITONEAL DIALYSIS TREATMENT IN PATIENTS OF THE GENERAL HOSPITAL OF ZONE No194*. October, 2021
4. Angélica López Flores. *EFFECT OF ORAL ADMINISTRATION OF BOVINE LACTOFERRIN ON ANTIBODY LEVELS FROM SERUM AS WELL AS T AND B LYMPHOCYTE POPULATIONS IN MOUSE SPLEEN.* October, 2019
5. Karla Alejandra Barrón Graciano. *PORIN mRNA EXPRESSION LEVEL IN THREE SPECIES OF NAEGLERIA AND ITS ROLE AS A VIRULENCE FACTOR.* December, 2021
6. FRIDA CARRILLO MORALES. *ANALYSIS OF SPECIFIC IGA AND IGG ANTIBODIES RESPONSE AGAINST NAEGLERIA FOWLERI FROM LABORATORY WORK PEOPLE*. June, 2019
7. Laura Gabriela Pérez Lozano. *ROLE OF THE 37 KDA MOLECULE OF NAEGLERIA FOWLERI IN THE MOUSE MODEL OF PRIMARY AMOEBIC MENINGOENCEPHALITIS*. June, 2016
8. Andrea Margarita Mejía Ángel. *DETECTION OF N-ACETYLGALACTOSAMINE GLYCOPROTEINS AS POTENTIALLY IMMUNOGENIC ANTIGENS OF NAEGLERIA FOWLERI*. August, 2017
9. Miguel Ángel Ramos de Dios. *DETECTION OF THE GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE GENE FROM NAEGLERIA FOWLERI AND ITS POTENTIAL ROLE AS A VIRULENCE FACTOR IN PRIMARY AMOEBIC MENINGOENCEPHALITIS*. IN PROCESS.

**MASTER IN HEALTH SCIENCE PROGRAM (CO-DIRECTOR)**

1. Karla Alejandra Barrón Graciano. *ROLE OF NAEGLERIOPORES A AND B DURING THE EARLY STAGES OF PRIMARY AMEBIC MENINGOENCEPHALITIS IN THE MOUSE MODEL.* August, 2022
2. Mariela Esquivel Solis. *ANALYSIS OF SPECIFIC ANTIBODIES IN SERUM AND SALIVA AGAINST N. FOWLERI FROM MEXICALI VALLEY-BAJA CALIFORNIA INHABITANTS,* Mexico. January, 2022
3. Frida Carrillo Morales. EVALUATION OF THE IMMUNOPROTECTIVE ROLE OF THE 50 KDA POLYPEPTIDE BAND IN THE MODEL OF PRIMARY AMEBIC MENINGOENCEPHALITIS CAUSED BY NAEGLERIA FOWLERI. October, 2020
4. Carlos Uriel Hernández Jacobo*. IMMUNOMODULATORY EFFECT OF THE 250 KDA GLYCOPROTEIN OF NAEGLERIA FOWLERI ON DENDRITIC CELLS OF NALT, NASAL PASSAGES AND CERVICAL NODES FROM BALB/C MICE*. June.
5. Laura Gabriela Pérez Lozano. MGL ROLE IN THE RECOGNITION OF SPECIFIC ANTIGENS OF NAEGLERIA FOWLERI AND IN THE ACTIVATION OF THE ALTERNATIVE MACROPHAGE PATHWAY. June 2018.
6. *Itzel Berenice Rodríguez Mera.. DETECTION OF N. FOWLERI PHOSPHOLIPASE AND SPHINGOMYELINASE PROTEINS DURING PRIMARY AMOEBIC MENINGOENCEPHALITIS IN MOUSE.* January, 2018.
7. Sonia Trejo Rodríguez. *ANALYSIS OF THE HUMORAL IMMUNE RESPONSE OF INTRANASALLY IMMUNIZED MICE WITH A HUMAN IMMUNODEFICIENCY VIRUS (HIV) PEPTIDE DESIGNED FROM THE GP120 PROTEIN*. January, 2018
8. José Luis Osornio Rojas*. ANALYSIS OF THE IMMUNOGENIC POTENTIAL OF THREE PEPTIDES DESIGNED FROM GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE OF NAEGLERIA FOWLERI*. January, 2018
9. Diego Arturo Castillo Ramírez*. IDENTIFICATION BY ITS, SSU (18S) AND MRNA SEQUENCES OF A FREE-LIVING AMOEBA WITH PATHOGENIC POTENTIAL OF THE NAEGLERIA GENUS ISOLATED FROM A RECREATIONAL PARK*. December, 2016

DOCTORATE IN MEDICAL RESEARCH AND DOCTORATE IN BIOLOGICAL SCIENCES (CO-DIRECTOR)

1. Diego Arturo Castillo Ramírez. *ROLE OF THE 250 KDA POLYPEPTIDE BAND OF NAEGLERIA FOWLERI IN THE MENINGOENCEPHALITIS MOUSE MODEL AND IN THE α4β1 AND LFA-1 EXPRESSION ON B AND T LYMPHOCYTES.* September, 2023
2. Itzel Berenice Mera Rodríguez. *ROLE OF CATHEPSIN B FROM NAEGLERIA FOWLERI IN THE PRIMARY AMEBIC MENINGOENCEPHALITIS MODEL*. January, 2023
3. Mara Gutiérrez Sánchez. *IDENTIFICATION OF NAEGLERIA FOWLERI PROTEINS AS POSSIBLE VACCINE CANDIDATES AGAINST PRIMARY AMOEBIC MENINGOENCEPHALITIS*. September, 2020.
4. Miguel Ángel Ramírez Flores. *IDENTIFICATION OF MOLECULAR MARKERS OF FREE-LIVING AMOEBAS (NAEGLERIA SPP.) WITH PATHOGENIC POTENTIAL ISOLATED FROM A RECREATIONAL WATER BODY*. IN PROCESS.