

Part A. PERSONAL INFORMATION

CV date	8/12/2020
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First and Family name	Miren Itziar Alcorta Calvo		
Social Security, Passport, ID number	16037937Z	Age	56
Researcher codes	Open Researcher and Contributor ID (ORCID**)	0000-0001-6978-389X	
	SCOPUS Author ID (*)	7005819295	
	WoS Researcher ID (*)	Y-6267-2019	

(*) *Optional*

(**) *Mandatory*

A.1. Current position

Name of University/Institution	University of the Basque Country (UPV/EHU)		
Department	Department of Biochemistry and Molecular Biology		
Address and Country	Barrio Sarriena s/n, 48940 Leioa, Bizkaia, España		
Phone number	946012568	E-mail	itzi.alkorta@ehu.eus
Current position	Lecturer (accredited Full Professor)	From	09/08/2003
Key words	Type (IV) coupling proteins, conjugative plasmids, bacterial conjugation, antibiotic resistance, horizontal gene transfer, agricultural amendments, soil quality		

A.2. Education

PhD, Licensed, Graduate	University	Year
PhD Sciences, Biochemistry	University of the Basque Country	1994
Graduate (Licenciado) in Chemistry	University of the Basque Country	1987

A.3. General indicators of quality of scientific production (from January 2010)

- Number of six-year terms: **3** (Date of the last one granted = **12/31/2016**)
- PhD theses directed from January 2010: **4** (2 in progress)
- Number of SCOPUS papers from January 2010: 40 (TOTAL NUMBER = **71**)
- Number of WEB OF SCIENCE papers from January 2010: 45 (TOTAL NUMBER = 74)
- SCOPUS h-index: **23** / WEB OF SCIENCE h-index: **21**
- Number of SCOPUS papers in the first quartile: 56 out of 71 publications
- Total SCOPUS citations from 2010: 625 (TOTAL CITATIONS = 3091)
- Average SCOPUS citations per year in the last 5 years: **54**

Part B. CV SUMMARY (*max. 3500 characters, including spaces*)

PhD Thesis (1994): "Immobilization of *Penicillium italicum* pectin lyase" pioneer work in biotechnology. **Postdoctorate (Lawrence Berkeley Laboratory, UC Berkeley, 1993-1995):** study of topoisomerase I of *Rhodococcus capsulatus*. **Current:** Biofisika Institute (UPV/EHU, CSIC) and the Department of Biochemistry and Molecular Biology, UPV/EHU (1996-). **Research line: Membrane strategies against antibiotic resistance spread among bacteria**, we aim to provide solutions to solve the problem of increasing infections by resistant bacteria. **Relevant achievements: 1)** First electron microscopy images of TrwB, the coupling protein family paradigm (Hormaeche J Biol Chem 2002). **2)** The transmembrane domain of TrwB (TMD) confers on TrwB specificity for ATP and GTP (Hormaeche FEBS Lett 2006), proposing that its TMD is its regulatory element. **3)** Reconstitution of TrwB in liposomes. **4)** The TMD and the membrane confer TrwB specificity and high affinity for ATP for the ATPase activity of TrwB in bacterial conjugation (Vecino BBA Biomembr 2010; Vecino BBA Biomembr 2011; Vecino BBA Biomembr 2012). **5)** The TMD plays a role in interactions of TrwB with the secretion system of plasmid R388 (Segura BBA Biomembr 2013). **6)** Subcellular location of TrwB (Segura BBA Biomembr 2014). **7)** First work showing that TMD leads TrwB to the poles of bacteria. **8)** First studies about one of the few coupling protein of mobilizable plasmids, MobB (Álvarez-Rodríguez Front Mol Biosci 2020). At this moment our results allow us to search for **specific inhibitors of TrwB to stop the spread of antibiotic resistance among bacteria** by specific inhibition of bacterial conjugation. In 2011, we began to study the relationship between conjugation and resistance genes in hospitals and agricultural settings to assess **the real risk antibiotic resistance spread**. At the **clinical level**, our membrane proteomics in nonpathogenic strains of *Staphylococcus*



epidermidis demonstrate that growth in biofilms causes expression of pathogenicity proteins (Águila-Arcos J Membr Biol 2015; Águila-Arcos Front Microbiol 2017). In collaboration with the company Largentec GmbH we developed an antimicrobial coating to inhibit biofilms (Guridi Mater Sci Eng C Mater Biol Appl 2015).

In the **environmental field**, studies on mine soils amended with animal manure confirm the high prevalence of transfer genes (Garaiurrebaso FEMS Microbiol Eco 2017; Garbisu Sci Total Environ 2018). Our most recent studies on the effect of sewage sludge in agricultural soils reveal antibiotic resistance gene abundance (Urreaga Sci Total Environ 2019; Gómez-Sagasti J Hazard Mater 2019; Urreaga Appl Soil Ecol 2019). All this have contributed to support the hypothesis that points to the **environment as a starting point for the control of the antibiotic resistance dissemination**.

In addition, we are investigating on solid lipid nanoparticles for drug delivery. In the future, this strategy will allow the encapsulation of conjugation inhibitors that are intended to find in this proposal (Arana Colloids Surf B Biointerfaces 2015; Cervantes J Clin Med 2019; Arana Nanomaterials 2019).

Academic and scientific management: Vice Dean of the Faculty of Science and Technology (February 2009-July 2015), Director of the Biofisika Institute (UPV/EHU, CSIC) (July 2015-February 2018). Since July 2018, coordinator of the Environmental Antibiotic Resistance Joint Research Laboratory and since July 2020, coordinator of the Doctorate Program Molecular Biology and Biomedicine.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (see instructions)

1. Álvarez-Rodríguez I, Ugarte-Urbe B, de la Arada I, Arrondo JRL, Garbisu C, **Alkorta I**. Conjugative coupling proteins and the role of their domains in conjugation, secondary structure and *in vivo* subcellular location. *Frontiers in Molecular Biosciences*. 20 August (2020) 7:185
2. Álvarez-Rodríguez I, Arana L, Ugarte-Urbe B, Gómez-Rubio E, Martín-Santamaría S, Garbisu C., **Alkorta, I**. Type IV coupling proteins as drug targets to control antibiotic resistance spread. *Frontiers in Molecular Biosciences* 12 August (2020) 7:201
3. Urreaga J, **Alkorta I**, Garbisu C. Potential benefits and risks for soil health derived from the use of organic amendments in agriculture. *Agronomy* (2019) 9:542
4. Urreaga J, **Alkorta I**, Lanzén A, Mijangos I, Garbisu C. The application of fresh and composted horse and chicken manure affects soil quality, microbial composition and antibiotic resistance. *Applied Soil Ecology* (2019) 135:73-84
5. Urreaga J, **Alkorta I**, Mijangos I, Epelde L, Garbisu C. Application of sewage sludge to agricultural soil increases the abundance of antibiotic resistance genes without altering the composition of prokaryotic communities. *Science of the Total Environment* (2019) 647:1410-1420
6. Garbisu C, Garaiurrebaso O, Lanzén A, Álvarez-Rodríguez I, Arana L, Blanco F, Smalla K, Grohmann E, **Alkorta I**. Mobile genetic elements and antibiotic resistance in mine soil amended with organic wastes. *Science of the Total Environment* (2018) 621: 725-733
7. **Authors:** Llosa, M., **Alkorta, I**. **Title of the chapter:** “Coupling proteins in Type IV secretion” **Book:** “Type IV Secretion in Gram-negative and Gram-positive bacteria”, (Backert, S. y Grohmann, E., editors) **Series:** Current topics in Microbiology and Immunology (Springer eds) ISBN 978-3-319-75240-2, pp. 143-168, (2018)
8. Águila-Arcos S, Álvarez-Rodríguez I, Garaiurrebaso O, Garbisu C, Grohmann E, **Alkorta I**. Biofilm-forming clinical *Staphylococcus* isolates harbor horizontal transfer and antibiotic resistance genes. *Frontiers in Microbiology* Oct 16 (2017) 8:2018
9. Segura RL, Águila-Arcos S, Vecino AJ, de la Cruz F, Goñi FM, **Alkorta I**. Subcellular location of the coupling protein TrwB and the role of its transmembrane domain. *BBA Biomembranes* (2014) 1838:223-230
10. Vecino AJ, Segura RL, Ugarte-Urbe B, Águila S, Hormaeche I, de la Cruz F, Goñi FM, **Alkorta I**. Reconstitution in liposome bilayers enhances nucleotide binding affinity and ATP-specificity of TrwB conjugative coupling protein. *BBA Biomembranes* (2010) 1798:2160-2169

C.2. Research projects

1. REFERENCE: EUSK20/02. TITLE: “Agudización de la crisis sanitaria de la resistencia a los antibióticos asociada a la pandemia Covid-19. COVID-AR”. FOUNDING INSTITUTION: Euskampus Resiliencia Covid-19 (2020). LENGTH: 01/10/2020-31/12/2021. AMOUNT: 40.000 €. **PI: Dr. I. Alkorta. Principal investigator and Coordinator (UPV/EHU, University of Bordeaux, Tecnalia)**



2. REFERENCE: KK-2020/00007. TITLE: “EMERGENCIA Y DISEMINACIÓN DE RESISTENCIAS A LOS ANTIBIÓTICOS: VÍNCULOS ENTRE SALUD HUMANA, GANADERÍA, ALIMENTACIÓN Y MEDIOAMBIENTE”. FOUNDING INSTITUTION: Gobierno Vasco Convocatoria ELKARTEK (2020). LENGTH: 01/01/2020-31/12/2021. AMOUNT: 81.368 €. **PI: Dr. I. Alkorta. Principal investigator**
3. REFERENCE: COLAB19/08. TITLE: “Development of methodological tools for assessment of the impact and risk of antibiotic resistance in the environment”. FOUNDING INSTITUTION: Convocatoria Proyectos Colaborativos UPV/EHU (2019). LENGTH: 01/01/2020-31/12/2021. AMOUNT: 24.800 €. **PI: Dr. I. Alkorta. Principal investigator**
4. REFERENCE: GIU18/229. TITLE: “Control de la diseminación de resistencias a antibióticos entre bacterias de diferentes orígenes mediante la búsqueda de inhibidores de la conjugación bacteriana”. FOUNDING INSTITUTION: Convocatoria para la concesión de ayudas a los grupos de investigación en la Universidad del País Vasco/Euskal Herriko Unibertsitatea (2018). LENGTH: 01/01/2019-31/12/2021. AMOUNT: 40.000 €. **PI: Dr. I. Alkorta. Principal investigator**
5. REFERENCE: KK2015/0000088. TITLE: “Investigación estratégica y desarrollo tecnológico en nanomedicina: aplicación a cultivo celular, diagnóstico y terapia de enfermedades infecciosas y cáncer”. FOUNDING INSTITUTION: Gobierno Vasco, Convocatoria ETORTEK BioMagune15. LENGTH: 01/01/2015-31/12/2016. AMOUNT: 84.584 €. **PI: Dr. I Alkorta. Principal investigator**
6. REFERENCE: MICINN12/79. TITLE: “Proteínas de membrana: Muchas preguntas sin respuesta”. FOUNDING INSTITUTION: Ministerio Economía y Competitividad. LENGTH: 01/01/2013-31/12/2015. AMOUNT: 196.560 €. **PI: Dr. F. M. Goñi (UPV/EHU). Researcher**
7. REFERENCE: ETORTEK13/03 BIOMAGUNE. TITLE: “Investigación estratégica y desarrollo tecnológico de nanopartículas de oro multifuncionales para terapia y diagnóstico *in vitro* de cáncer y desarrollo de aplicaciones en glicotecnología”. FOUNDING INSTITUTION: Gobierno Vasco, Convocatoria ETORTEK13/03 BIOMAGUNE. LENGTH: 01/01/2013-31/06/2015. AMOUNT: 176.284 €. **PI: Dr. I. Alkorta (UPV/EHU). Principal investigator**
8. REFERENCE: 612TK201200026. TITLE: “Desarrollo de nanopartículas lipídicas en encapsulación de compuestos activos para su administración controlada en oftalmología”. FOUNDING INSTITUTION: BFA-DFB, Departamento de Promoción Económica Convocatoria Plan de Ayudas a Proyectos de Investigación en Centros de Excelencia. LENGTH: 01/01/2011-30/06/2014. AMOUNT: 372.435 €. **PI: Dr. Itziar Alkorta (UPV/EHU). Principal investigator**
9. REFERENCE: US11/20. TITLE: “Desarrollo de nuevas estrategias para combatir la resistencia a antibióticos”. FOUNDING INSTITUTION: UPV/EHU, Universidad-Sociedad 2011. LENGTH: 10/11/2011-9/11/2013. AMOUNT: 16.000. € **PI: Dr. I. Alkorta (UPV/EHU). Principal investigator**
10. REFERENCE: MEC07/49. TITLE: “De las proteínas de membrana a la proteómica de membranas”. FOUNDING INSTITUTION: Programa Nacional de Biología Fundamental, Ministerio de Ciencia y Tecnología. LENGTH: 01/12/2007-30/11/2012. AMOUNT: 534.820 €. **PI: Dr. F. M. Goñi (UPV/EHU). Dr. I. Alkorta Researcher**

C.3. Contracts, technological or transfer merits

1. TITLE: “Remediación de la toxicidad derivada de la deposición de fangos de depuradora en suelos del vertedero17”. COMPANY: Convenio con el Ayuntamiento de Gernika-Lumo CONV18/11. LENGTH: 12/12/2018-30/09/2020. AMOUNT: 3.764,71 €- **PI: Dr. Manuel Soto. Dr. I. Alkorta Researcher**
2. TITLE: “Producción de SLN para ensayos *in vivo*”. COMPANY: Research contract between Unidad de Biofísica (CSIC, UPV/EHU) and the company FAES FARMA. LENGTH: 01/09/2015-15/09/2015. AMOUNT: 3.764,71 €. **PI: Dr. I. Alkorta**
3. TITLE: “Análisis del efecto del catalizador de contacto AgXX (sustancia bactericida a base de plata y platino) (www.agxx.de) sobre Legionella”. COMPANY: Research contract between Unidad de Biofísica (CSIC, UPV/EHU) and the company LARGENTEC VERTRIEBS GMBH. LENGTH: 01/02/2011-31/09/2012. AMOUNT: 13.256 €. **PI: Dr. I. Alkorta and Dr. E. Grohmann**

C.4. Main stays in research centers

- Diamond Light Source Ltd, Oxfordshire, UK, March 2013
- Centro de Investigaciones Biológicas (CSIC), Madrid, September 2018-July 2019



C.5. Outreach activities and publications

- 1. Director of Summer Course** (UPV/EHU) “Resistencia a antibióticos. Una visión One Health: personas y animales sanos y medio ambiente más seguro”. Bizkaia Aretoa (UPV/EHU), Bilbao, 17-18 July 2020
- 2.** Alkorta, I., y Garbisu, C. “¿Quiere tomar mejores decisiones? Aprenda microbiología” El País, (15 Mayo, 2020) https://elpais.com/elpais/2020/05/15/planeta_futuro/1589528739_211865.html
- 3.** Alkorta, I., y Garbisu, C. “¿Quiere tomar mejores decisiones? Aprenda microbiología” Cathedra UPV/EHU, (1 Junio, 2020) <https://www.ehu.es/es/-/quiere-tomar-mejores-decisiones-aprenda-microbiologia>
- 4.** Alkorta, I., y Garbisu, C. “¿Quiere tomar mejores decisiones? Aprenda microbiología” Theconversation.com, plataforma digital independiente, (14 Mayo, 2020) (ISSN 2201-5639) <https://theconversation.com/quiere-tomar-mejores-decisiones-aprenda-microbiologia-136808>
- 5. Director of Summer Course** (UPV/EHU) “Resistencia a antibióticos en el medio ambiente: origen de un escenario apocalíptico”. PiE (UPV/EHU), Plencia, 18-19 July 2019
- 6.** Alkorta, I., y Garbisu, C. “Así se propaga la resistencia a los antibióticos en el medioambiente” Cathedra UPV/EHU, (15 Febrero, 2019) <https://www.ehu.es/es/-/cathedra-itziar-alkorta-calvo>
- 7.** Alkorta, I., y Garbisu, C. “Así se propaga la resistencia a los antibióticos en el medioambiente” Theconversation.com, plataforma digital independiente, (6 Febrero, 2019) <http://theconversation.com/asi-se-propaga-la-resistencia-a-los-antibioticos-en-el-medioambiente-110390>
- 8.** Alkorta, I., y Garbisu, C. “Claves de la resistencia a los antibióticos” ElPeriodico, (19 Febrero 2019). http://archivo.elperiodico.com/ed/20190219/pag_008.html
- 9.** Alkorta, I. “La conjugación bacteriana y el desafío de la resistencia a antibióticos” SEBBM Divulgación, Vol. 182 Acércate a nuestros científicos, (2014). http://www.sebbm.es/ES/divulgacion-ciencia-para-todos_10/itziar-alkorta---noviembre-2014-resistencia-a-antibioticos_1078
- 10.** Alkorta, I. “Medicina en nanogotas” SEBBM Divulgación, El profesor de ciencias, (Agosto 2015). http://www.sebbm.es/web/images/archivos/archivos_tinymce/agosto2015_itziaralkorta.pdf

C.6. Organizational and management experience

- Bilbao Advanced Workshops on Biophysics: Biophysical Aspects of Type IV Secretion (International). Organization of Workshop. Bilbao, 17-22 September 2012
- Fourth Alumni Research Meeting. Faculty of Science and Technology, UPV/EHU (National). Bilbao, 17 December 2014
- XXXVIII Congress Sociedad Española de Bioquímica y Biología Molecular (Nacional). Organization of the congress (Executive board SEBBM). Valencia, 7-10 September 2015

C.7. Academic and scientific management

- **Coordinator of the Doctorate Program** Molecular Biology and Biomedicine UPV/EHU. July 2020-at present
- **Coordinator of the Environmental Antibiotic Resistance Joint Research Laboratory.** July 2018-at present
- **Head of Instituto Biofisika**, Joint Center CSIC-UPV/EHU. July 2015-February 2018.
- **Vice Dean**, Science and Technology Faculty (UPV/EHU). February 2009-July 2015.
- Member of **Sociedad Española de Bioquímica y Biología Molecular** (SEBBM) board. September 2014-September 2018.

C.8. Research Agency Evaluator

United States-Israel Binational Agricultural Research and Development Fund; Natural Sciences Commission of the Czech Science Foundation; Austrian Science Fund (FWF); Fundación Kaertor; National Science Centre Poland (PRELUDIUM-18), 2020; French National Research Agency ANR, 2020

C.9. Other indicators

Other publications: **30**/ Contributions to congresses: **80**/ Thesis supervised: **6 (3 international) and 2 ongoing**/Master and Degree thesis: **20**