

# Francesco Beghini, PhD

POSTDOCTORAL ASSOCIATE

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## Education

### PhD in Biomolecular Sciences (cum laude)

UNIVERSITÀ DEGLI STUDI DI TRENTO

Trento, IT

2017 - 2021

### MSc in Cellular and Molecular Biotechnology - Neurobiology

UNIVERSITÀ DEGLI STUDI DI TRENTO

Trento, IT

2015 - 2017

### BSc Computer Science with specialization in Biomolecular Sciences

UNIVERSITÀ DEGLI STUDI DI TRENTO

Trento, IT

2012 - 2015

## Positions

### Postdoctoral Associate at Human Nature Lab, Yale University

Mentor: Prof. Nicholas Christakis

04/2022 - Current

### Postdoctoral Fellow at Segata Lab, UniTN

Mentor: Prof. Nicola Segata

09/2021 - 04/2022

### Consultant for Human Nature Lab, Yale University

Mentor: Prof. Nicholas Christakis

05/2021 - 08/2021

### Internship at Segata Lab, UniTN

Mentor: Prof. Nicola Segata

11/2015 - 11/2017

### Internship at School of Public Health, CUNY

Mentor: Prof. Levi Waldron

02/2017 - 03/2017

### Internship at Segata Lab, UniTN

Mentor: Prof. Nicola Segata

11/2014 - 09/2015

## Extending and improving metagenomic taxonomic profiling with uncharacterized species using MetaPhlAn 4

*Nature Biotechnology*

AITOR BLANCO-MÍGUEZ, FRANCESCO BEGHINI, FABIO CUMBO, LAUREN J. MCIVER, KELSEY N. THOMPSON, MORENO ZOLFO, PAOLO MANGHI, LEONARD DUBOIS, KUN D. HUANG, ANDREW MALTEZ THOMAS, WILLIAM A. NICKOLS, GIANMARCO PICCINNO, ELISA PIPERNI, MICHAL PUNČOCHÁŘ, MIREIA VALLES-COLOMER, ADRIAN TETT, FRANCESCA GIORDANO, RICHARD DAVIES, JONATHAN WOLF, SARAH E. BERRY, TIM D. SPECTOR, ERIC A. FRANZOSA, EDOARDO PASOLLI, FRANCESCO ASNICAR, CURTIS HUTTENHOWER, NICOLA SEGATA

2023-11

## Thermal Therapy Modulation of the Psoriasis-Associated Skin and Gut Microbiome

*Dermatology and Therapy*

SERENA MANARA, FRANCESCO BEGHINI, GIULIA MASETTI, FEDERICA ARMANINI, DAVIDE GEAT, GIULIA GALLIGIONI, NICOLA SEGATA, STEFANIA FARINA, MARIO CRISTOFOLINI

2023-11

## Environmental, Socioeconomic, and Health Factors Associated with Gut Microbiome Species and Strains in Isolated Honduras Villages

SHIVKUMAR VISHNEMPET SHRIDHAR, FRANCESCO BEGHINI, MARCUS ALEXANDER, ADARSH SINGH, RIGOBERTO MATUTE JUÁREZ, ILANA L. BRITO, NICHOLAS A. CHRISTAKIS

2023-04

## Detailed Social Network Interactions and Gut Microbiome Strain-Sharing Within Isolated Honduras Villages

JACKSON PULLMAN, FRANCESCO BEGHINI, MARCUS ALEXANDER, SHIVKUMAR VISHNEMPET SHRIDHAR, DREW PRINSTER, ILANA L. BRITO, NICHOLAS A. CHRISTAKIS

2023-04

## Variability of strain engraftment and predictability of microbiome composition after fecal microbiota transplantation across different diseases

*Nature Medicine*

GIANLUCA IANIRO, MICHAL PUNČOCHÁŘ, NICOLAI KARCHER, SERENA PORCARI, FEDERICA ARMANINI, FRANCESCO ASNICAR, FRANCESCO BEGHINI, AITOR BLANCO-MÍGUEZ, FABIO CUMBO, PAOLO MANGHI, FEDERICA PINTO, LUCA MASUCCI, GIANLUCA QUARANTA, SILVIA DE GIORGI, GIUSI DESIRÈ SCIUÈ, STEFANO BIBBÒ, FEDERICA DEL CHIERICO, LORENZA PUTIGNANI, MAURIZIO SANGUINETTI, ANTONIO GASBARRINI, MIREIA VALLES-COLOMER, GIOVANNI CAMMAROTA, NICOLA SEGATA

2022-09

## Critical Assessment of Metagenome Interpretation: the second round of challenges

*Nature Methods*

FERNANDO MEYER, ADRIAN FRITZ, ZHI-LUO DENG, DAVID KOSLICKI, TILL ROBIN LESKER, ALEXEY GUREVICH, GARY ROBERTSON, MOHAMMED ALSER, DMITRY ANTIPOV, FRANCESCO BEGHINI, DENIS BERTRAND, JAQUELINE J. BRITO, C. TITUS BROWN, JAN BUCHMANN, AYDIN BULUÇ, BO CHEN, RAYAN CHIKHI, PHILIP T. L. C. CLAUSEN, ALEXANDRU CRISTIAN, PIOTR WOJCIECH DABROWSKI, AARON E. DARLING, ROB EGAN, ELEAZAR ESKIN, EVANGELOS GEORGANAS, EUGENE GOLTSMAN, MELISSA A. GRAY, LARS HESTBJERG HANSEN, STEVEN HOFMEYER, PINGQIN HUANG, LUIZ IRBER, HUIJUE JIA, TUE SPARHOLT JØRGENSEN, SILAS D. KIESER, TERJE KLEMETSEN, AXEL KOLA, MIKHAIL KOLMOGOROV, ANTON KOROBENNIKOV, JASON KWAN, NATHAN LAPIERRE, CLAIRE LEMAITRE, CHENHAO LI, ANTOINE LIMASSET, FABIO MALCHER-MIRANDA, SERGHEI MANGUL, VANESSA R. MARCELINO, CAMILLE MARCHET, PIERRE MARIJON, DMITRY MELESHKO, DANIEL R. MENDE, ALESSIO MILANESE, NIRANJAN NAGARAJAN, JAKOB NISSEN, SERGEY NURK, LEONID OLIKER, LUCAS PAOLI, PIERRE PETERLONGO, VITOR C. PIRO, JACOB S. PORTER, SIMON RASMUSSEN, EVAN R. REES, KNUT REINERT, BERNHARD RENARD, ESPEN MIKAL ROBERTSEN, GAIL L. ROSEN, HANS-JOACHIM RUSCHWEYH, VARUNI SARWAL, NICOLA SEGATA, ENRICO SEILER, LIZHEN SHI, FENGZHU SUN, SHINICHI SUNAGAWA, SØREN JOHANNES SØRENSEN, ASHLEIGH THOMAS, CHENGXUAN TONG, MIRKO TRAJKOVSKI, JULIEN TREMBLAY, GHERMAN URITSKIY, RICCARDO VICEDOMINI, ZHENGYANG WANG, ZIYE WANG, ZHONG WANG, ANDREW WARREN, NILS PEDER WILLASSEN, KATHERINE YELICK, RONGHUI YOU, GEORG ZELLER, ZHENGQIAO ZHAO, SHANFENG ZHU, JIE ZHU, RUBEN GARRIDO-OTER, PETRA GASTMEIER, STEPHANE HACQUARD, SUSANNE HÄUSSLER, ARIANE KHALEDI, FRIEDERIKE MAECHLER, FANTIN MESNY, SIMONA RADUTOIU, PAUL SCHULZE-LEFERT, NATHIANA SMIT, TILL STROWIG, ANDREAS BREMGES, ALEXANDER SCZYRBA, ALICE CAROLYN MCHARDY

2022-04

## Commensal Bifidobacterium Strains Enhance the Efficacy of Neo-Epitope Based Cancer Vaccines

*Vaccines*

MICHELE TOMASI, MATTIA DALSASS, FRANCESCO BEGHINI, ILARIA ZANELLA, ELENA CAPRONI, LAURA FANTAPPIÈ, ASSUNTA GAGLIARDI, CARMELA IRENE, ENRICO KÖNIG, LUCA FRATTINI, GIULIA MASETTI, SAMINE JESSICA ISAAC, FEDERICA ARMANINI, FABIO CUMBO, AITOR BLANCO-MÍGUEZ, ALBERTO GRANDI, NICOLA SEGATA, GUIDO GRANDI

2021-11

## Reporting guidelines for human microbiome research: the STORMS checklist

Nature Medicine

CHLOE MIRZAYI, AUDREY RENSON, CESARE FURLANELLO, SUSANNA-ASSUNTA SANSONE, FATIMA ZOHRA, SHAIMAA ELSAFOURY, LUDWIG GEISTLINGER, LORA J. KASSELMAN, KELLY ECKENRODE, JANNEKE VAN DE WIJGERT, AMY LOUGHMAN, FRANCINE MARQUES, DAVID A. MACINTYRE, MANIMOZHIYAN ARUMUGAM, RIMSHA AZHAR, FRANCESCO BEGHINI, KIRK BERGSTROM, AMI BHATT, JORDAN E. BISANZ, JONATHAN BRAUN, HECTOR CORRADA BRAVO, GREGORY A. BUCK, FREDERIC BUSHMAN, DAVID CASERO, GERARD CLARKE, MARIA CARMEN COLLADO, PAUL D. COTTER, JOHN F. CRYAN, RYAN T. DEMMER, SUZANNE DEVKOTA, ERAN ELINAV, JUAN S. ESCOBAR, JENNIFER FETTWEIS, ROBERT D. FINN, ANTHONY A. FODOR, SOFIA FORSLUND, ANDRE FRANKE, CESARE FURLANELLO, JACK GILBERT, ELIZABETH GRICE, BENJAMIN HAIBE-KAINS, SCOTT HANDLEY, PAMELA HERD, SUSAN HOLMES, JONATHAN P. JACOBS, LISA KARSTENS, ROB KNIGHT, DAN KNIGHTS, OMRY KOREN, DOUGLAS S. KWON, MORGAN LANGILLE

2021-11

## Integrating taxonomic, functional, and strain-level profiling of diverse microbial communities with bioBakery 3

eLife

FRANCESCO BEGHINI, LAUREN J MCIVER, AITOR BLANCO-MÍGUEZ, LEONARD DUBOIS, FRANCESCO ASNICAR, SAGUN MAHARJAN, ANA MAILYAN, PAOLO MANGHI, MATTHIAS SCHOLZ, ANDREW MALTEZ THOMAS, MIREIA VALLES-COLOMER, GEORGE WEINGART, YANCONG ZHANG, MORENO ZOLFO, CURTIS HUTTENHOWER, ERIC A FRANZOSA, NICOLA SEGATA

2021-05

## Microbiome connections with host metabolism and habitual diet from 1,098 deeply phenotyped individuals.

Nature medicine

ASNICAR F, BERRY SE, VALDES AM, NGUYEN LH, PICCINNO G, DREW DA, LEEMING E, GIBSON R, LE ROY C, KHATIB HA, FRANCIS L, MAZIDI M, MOMPEO O, SEGATA N

2021-01

## How inoculation affects the development and the performances of microalgal-bacterial consortia treating real municipal wastewater

Journal of Environmental Management

SERENA PETRINI, PAOLA FOLADORI, FRANCESCO BEGHINI, FEDERICA ARMANINI, NICOLA SEGATA, GIANNI ANDREOTTOLA

2020-06

## Precise phylogenetic analysis of microbial isolates and genomes from metagenomes using PhyloPhlAn 3.0

Nature Communications

FRANCESCO ASNICAR, ANDREW MALTEZ THOMAS, FRANCESCO BEGHINI, CLAUDIA MENGONI, SERENA MANARA, PAOLO MANGHI, QIYUN ZHU, MATTIA BOLZAN, FABIO CUMBO, UYEN MAY, JON G. SANDERS, MORENO ZOLFO, EVGUENIA KOPYLOVA, EDOARDO PASOLLI, ROB KNIGHT, SIAVASH MIRARAB, CURTIS HUTTENHOWER, NICOLA SEGATA

2020-05

## Microbial genomes from non-human primate gut metagenomes expand the primate-associated bacterial tree of life with over 1000 novel species.

Genome biology

MANARA S, ASNICAR F, BEGHINI F, BAZZANI D, CUMBO F, ZOLFO M, NIGRO E, KARCHER N, MANGHI P, METZGER MI, PASOLLI E, SEGATA N

2019-12

## Sociodemographic variation in the oral microbiome

Annals of Epidemiology

AUDREY RENSON, HEIDI E. JONES, FRANCESCO BEGHINI, NICOLA SEGATA, CHRISTINE P. ZOLNIK, MYKHAYLO USYK, THOMAS U. MOODY, LORNA THORPE, ROBERT BURK, LEVI WALDRON, JENNIFER B. DOWD

2019-07

## Tobacco exposure associated with oral microbiota oxygen utilization in the New York City Health and Nutrition Examination Study

Annals of Epidemiology

FRANCESCO BEGHINI, AUDREY RENSON, CHRISTINE P. ZOLNIK, LUDWIG GEISTLINGER, MYKHAYLO USYK, THOMAS U. MOODY, LORNA THORPE, JENNIFER B. DOWD, ROBERT BURK, NICOLA SEGATA, HEIDI E. JONES, LEVI WALDRON

2019-06

## Metagenomic analysis of colorectal cancer datasets identifies cross-cohort microbial diagnostic signatures and a link with choline degradation

Nature Medicine

ANDREW MALTEZ THOMAS, PAOLO MANGHI, FRANCESCO ASNICAR, EDOARDO PASOLLI, FEDERICA ARMANINI, MORENO ZOLFO, FRANCESCO BEGHINI, SERENA MANARA, NICOLAI KARCHER, CHIARA POZZI, SARA GANDINI, DAVIDE SERRANO, SONIA TARALLO, ANTONIO FRANCAVILLA, GAETANO GALLO, MARIO TROMPETTO, GIULIO FERRERO, SAYAKA MIZUTANI, HIROTSUGU SHIROMA, SATOSHI SHIBA, TATSUHIRO SHIBATA, SHINICHI YACHIDA, TAKUJI YAMADA, JAKOB WIRBEL, PETRA SCHROTZ-KING, CORNELIA M. ULRICH, HERMANN BRENNER, MANIMOZHIYAN ARUMUGAM, PEER BORK, GEORG ZELLER, FRANCESCA CORDERO, EMMANUEL DIAS-NETO, JOÃO CARLOS SETUBAL, ADRIAN TETT, BARBARA PARDINI, MARIA RESCIGNO, LEVI WALDRON, ALESSIO NACCARATI, NICOLA SEGATA

2019-04

## Extensive Unexplored Human Microbiome Diversity Revealed by Over 150,000 Genomes from Metagenomes Spanning Age, Geography, and Lifestyle.

Cell

PASOLLI E, ASNICAR F, MANARA S, ZOLFO M, KARCHER N, ARMANINI F, BEGHINI F, MANGHI P, TETT A, GHENSI P, COLLADO MC, RICE BL, DU LONG C, MORGAN XC, SEGATA N

2019-01

## Mother-to-Infant Microbial Transmission from Different Body Sites Shapes the Developing Infant Gut Microbiome.

Cell host and microbe

FERRETTI P, PASOLLI E, TETT A, ASNICAR F, GORFER V, FEDI S, ARMANINI F, TRUONG DT, MANARA S, ZOLFO M, BEGHINI F, BERTORELLI R, DE SANCTIS V, SEGATA N

2018-07

## Accessible, curated metagenomic data through ExperimentHub

Nature Methods

EDOARDO PASOLLI, LUCAS SCHIFFER, PAOLO MANGHI, AUDREY RENSON, VALERIE OBENCHAIN, DUY TIN TRUONG, FRANCESCO BEGHINI, FAIZAN MALIK, MARCEL RAMOS, JENNIFER B DOWD, CURTIS HUTTENHOWER, MARTIN MORGAN, NICOLA SEGATA, LEVI WALDRON

2017-11

## Large-scale comparative metagenomics of Blastocystis, a common member of the human gut microbiome

The ISME Journal

FRANCESCO BEGHINI, EDOARDO PASOLLI, TIN DUY TRUONG, LORENZA PUTIGNANI, SIMONE M CACCIÒ, NICOLA SEGATA

2017-08

## Unexplored diversity and strain-level structure of the skin microbiome associated with psoriasis

npj Biofilms and Microbiomes

ADRIAN TETT, EDOARDO PASOLLI, STEFANIA FARINA, DUY TIN TRUONG, FRANCESCO ASNICAR, MORENO ZOLFO, FRANCESCO BEGHINI, FEDERICA ARMANINI, OLIVIER JOUSSON, VERONICA DE SANCTIS, ROBERTO BERTORELLI, GIAMPIERO GIROLOMONI, MARIO CRISTOFOLINI, NICOLA SEGATA

2017-06

## Teaching

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### Tutor at CIBIO - University of Trento

Prof. Andrea Passerini

“COMPUTER SCIENCE” AND “COMPUTATIONAL BIOLOGY” TUTOR FOR CIBIO UNDERGRADUATE STUDENTS

10/2015 - 06/2018

## Courses

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### San Michele all'Adige, Italy

EMBO PRACTICAL COURSE - BIOINFORMATICS AND GENOME ANALYSES. TEACHING ASSISTANT FOR THE “SHOTGUN METAGENOMICS” SESSION

25/9/2019

## Talks

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### Microbiome Virtual International Forum

INTEGRATING TAXONOMIC, FUNCTIONAL, AND STRAIN-LEVEL PROFILING OF DIVERSE MICROBIAL COMMUNITIES WITH BIOBAKERY 3

21/11/2021

### Yale University - New Haven

SHOTGUN METAGENOMICS FOR SPECIES AND STRAIN-LEVEL ANALYSIS

01/10/2020

### University of Trento - Italy

LARGE-SCALE MICROBIAL GENOMICS FOR STRAIN-LEVEL METAGENOMIC ANALYSIS

08/10/2019

### City University of New York - New York

BRIEF LESSON GIVEN TO EPIDEMIOLOGY PHD STUDENTS ABOUT METAGENOMICS, ORAL MICROBIOME AND THE NYC-HANES II PROJECT

02/03/2017

### Columbia University - New York

SMOKING AND THE ORAL MICROBIOME IN THE NEW YORK CITY HEALTH AND NUTRITION EXAMINATION STUDY (NYC-HANES II)

23/02/2017

### City University of New York - New York

SMOKING AND THE ORAL MICROBIOME IN THE NEW YORK CITY HEALTH AND NUTRITION EXAMINATION STUDY (NYC-HANES II)

22/02/2017

### Albert Einstein Medical College of Medicine - New York

SMOKING AND THE ORAL MICROBIOME IN THE NEW YORK CITY HEALTH AND NUTRITION EXAMINATION STUDY (NYC-HANES II)

14/02/2017

### New York University - New York

SMOKING AND THE ORAL MICROBIOME IN THE NEW YORK CITY HEALTH AND NUTRITION EXAMINATION STUDY (NYC-HANES II)

13/02/2017

## Awards

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## Prêmio Octavio Frias de Oliveira

CO-RECIPIENT OF THE AWARD FOR THE PAPER “METAGENOMIC ANALYSIS OF COLORECTAL CANCER DATASETS IDENTIFIES CROSS-COHORT MICROBIAL DIAGNOSTIC SIGNATURES AND A LINK WITH CHOLINE DEGRADATION”

08/2019

## Microbiome in Health and Disease – Keystone Symposia, Colorado, USA

I WAS AWARDED 1,200\$ AS RECIPIENT OF THE KEYSTONE SYMPOSIA “FUTURE OF SCIENCE” SCHOLARSHIP AND SELECTED FOR A POSTER ENTITLED “LARGE-SCALE METAGENOMIC ANALYSIS OF BLASTOCYSTIS IN THE HUMAN GUT REVEALED HIGH PREVALENCE AND ASSOCIATION WITH BMI AND ARCHAEL ABUNDANCE”

02/2017

## Student co-supervision

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### Shivkumar Vishnempet Shridhar (PhD Biomedical Engineering - Yale University)

Supervisor: Prof. Nicholas Christakis

2021-

### Jackson Pullman (BSc Data Science - Yale University)

Supervisor: Prof. Nicholas Christakis

2021-2023

### Eleonora Nigro (MSc Quantitative and Computational Biology - CIBIO)

Supervisor: Prof. Nicola Segata

EXPANDING THE GENETIC DIVERSITY OF THE ELUSIMICROBIA BACTERIAL PHYLUM BY MULTI-ENVIRONMENT METAGENOMIC ANALYSIS

2019

## Posters

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### An integrated pipeline for large-scale phylogenetic characterization of genomes and metagenomes

BITS - Turin, Italy

ASNICAR FRANCESCO, BEGHINI FRANCESCO, BOLZAN MATTIA, MANARA SERENA, PASOLLI EDOARDO, MIRARAB SIAVASH, HUTTENHOWER CURTIS, SEGATA NICOLA

06/2018

### Nutrient removal and microbial community analysis of a stable microalgal-bacterial consortium treating real municipal wastewater

Leading Edge Conference on Water and Wastewater Technologies - Edinburgh, UK

PETRINI SERENA, FOLADORI PAOLA, BEGHINI FRANCESCO, ARMANINI FEDERICA, SEGATA NICOLA, ANDREOTTOLA GIANNI

06/2018

### Large-scale metagenomic analysis of Blastocystis in the human gut revealed association with Body Mass Index and archaeal abundance

Microbiome in Health and Disease – Keystone Symposia, Colorado, USA

FRANCESCO BEGHINI, EDOARDO PASOLLI, DUY TIN TRUONG, LORENZA PUTIGNANI, SIMONE M. CACCIÒ, NICOLA SEGATA

02/2017

### Genomic and metagenomic-based epidemiology and transmission networks of MRSA in two Italian hospitals

ECCMID – Wien, Austria

SERENA MANARA, EDOARDO PASOLLI, DANIELA DOLCE, FEDERICA ARMANINI, FRANCESCO BEGHINI, NOVELLA RAVENNI, ERICA CAMERA, GRAZIA DINNELLA, PAOLA GUALDI, MICHELE SCHINELLA, SILVIA CAMPANA, ERMANNO BALDO, GIOVANNI TACCETTI, NICOLA SEGATA

04/2017

### Strain-level bacterial and viral diversity in the MetaSUB dataset

CAMDA2017 – Prague, Czech Republic

MORENO ZOLFO, FEDERICA PINTO, FRANCESCO ASNICAR, FRANCESCO BEGHINI, PAOLO MANGHI, EDOARDO PASOLLI, ADRIAN TETT AND NICOLA SEGATA

07/2017

## Languages

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Italian: Mother tongue

Spanish: Bilingual proficiency

English: Professional working proficiency

## Skills

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I have a very good experience with Linux, MacOS, and Windows OS' with a good knowledge of bioinformatic and several computational biology tools.

I use Bash, R and Python every day. Other known programming languages are Java, C/C++/C#, JavaScript, PHP, SQL and the .NET framework.

During the laboratory trainee activities in my BSc and MSc I acquired some molecular biology related skills and during my internship at the Waldron Lab I acquired statistical and basic epidemiology skills.