

ELISABETTA DE BERNARDI

PERSONAL INFORMATION

Date of birth: 05/11/1977

Nationality: Italian

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ORCID ID: 0000-0002-8394-0342

CURRENT POSITION

11/2011 – now: Assistant Professor SSD ING-INF/06, Medicine and Surgery Department, University of Milano-Bicocca, Monza, Italy

PROFESSIONAL EXPERIENCE

12/2010-10/2011: post-doctoral research fellow at Bioengineering Department, Politecnico di Milano; main topic: preclinical 19F-MRI

06/2010-11/2010: research grant from AFOL Milano, project “Women at work in scientific research and technologic development”; project title “19F-FDG MRI: feasibility study for preclinical analyses”

06/2007-05/2010: post-doctoral research fellow at Bioengineering Department, Politecnico di Milano; main topic: oncological PET image reconstruction improvement.

03/2006-05/2006: term contract at Bioengineering Department, Politecnico di Milano; topic: dental CT acquisition simulation

EDUCATION

2007: PhD in Bioengineering, Politecnico di Milano, thesis: “Accuracy optimization in Positron Emission Tomography for oncological applications”

2002: Laurea cum laude in Biomedical Engineering, Politecnico di Milano

TEACHING ACTIVITY

a.a. 2021-2022: APPARECCHIATURE DI MEDICINA NUCLEARE (8 hours), TECNICHE DI RADIOLOGIA MEDICA, PER IMMAGINI E RADIOTERAPIA bachelor degree, University of Milano Bicocca

a.a. 2018-2019; a.a. 2021-2022: INSTRUMENTATION FOR DIAGNOSTIC IMAGING AND RADIOTHERAPY (10 hours), MEDICINE AND SURGERY single cycle master degree, University of Milano-Bicocca

a.a. 2011-2012 – a.a. 2023-2024: FORMAZIONE ED ELABORAZIONE DELLE IMMAGINI TC E ANGIOGRAFICHE (12 hours), TECNICHE DI RADIOLOGIA MEDICA, PER IMMAGINI E RADIOTERAPIA bachelor degree, University of Milano Bicocca

a.a. 2014-2015 – a.a. 2023-2024: BIOINGEGNERIA ELETTRONICA ED INFORMATICA (16 hours), MEDICINA NUCLEARE, RADIODIAGNOSTICA, RADIOTERAPIA specialization schools, University of Milano Bicocca

a.a. 2014-2015 – a.a. 2018-2019; a.a. 2021-2022: ELABORAZIONE DELLE INFORMAZIONI (8 hours), TERAPIA DELLA NEURO E PSICOMOTRICITA' DELL'ETA' EVOLUTIVA bachelor degree, University of Milano-Bicocca

a.a. 2014-2015 – a.a. 2018-2019; a.a. 2021-2022: BIOINGEGNERIA ELETTRONICA E INFORMATICA (8 hours), FISIOTERAPIA bachelor degree, University of Milano-Bicocca

a.a. 2011-2012 – a.a. 2018-2019: BIOINGEGNERIA ELETTRONICA ED INFORMATICA (8 hours), MEDICINA E CHIRURGIA single cycle master degree, University of Milano-Bicocca

a.a. 2003-2004 - a.a. 2011-2012: teaching assistant in BIOIMMAGINI, INGEGNERIA BIOMEDICA master degree, Politecnico di Milano

a.a. 2007-2008 – a.a. 2010-2011: teaching assistant in METODI PER IMMAGINI FUNZIONALI E 3D, INGEGNERIA BIOMEDICA master degree, Politecnico di Milano

#### OTHER EDUCATIONAL ACTIVITIES

a.a. 2023-2024: B1-B2 and Biomedical English exams for Medicine and Surgery Department, University of Milano Bicocca

#### RESEARCH TOPICS

Biomedical image reconstruction, segmentation and quantification; radiomics and deep radiomics in PET, TC and MRI.

#### AFFILIATIONS TO SCIENTIFIC SOCIETIES, TASK GROUPS AND INTERDEPARTEMENTAL CENTERS

GNB - Associazione Gruppo Nazionale Bioingegneria

American Association of Physicist in Medicine (AAPM) Task Group 211: Classification, advantages and limitations of the Auto-Segmentation approaches for PET

American Association of Physicist in Medicine (AAPM) Task Group 363: Guidelines for harmonizing the validation of tumor PET auto-segmentation algorithms

BICOCCA BIOINFORMATICS BIOSTATISTICS AND BIOIMAGING CENTRE –B4 interdepartmental research centre, University of Milano Bicocca

GlioBlastoMa-Bicocca-TRANslational-Center - GBM-BI-TRACE, University of Milano Bicocca

Departmental Study Center for Digital Medicine, University of Milano Bicocca

#### PUBLICATIONS

[https://boa.unimib.it/browse?type=author&authority=rp02756&sort\\_by=2&order=DESC](https://boa.unimib.it/browse?type=author&authority=rp02756&sort_by=2&order=DESC)

33 papers, 2 book chapters, H index (Google Scholar) 13 – H index (Scopus) 12 – Total citation number (Scopus) 560

#### INVITED TALKS

Metodi di segmentazione avanzata: applicazioni in oncologia, XXXVII SCUOLA ANNUALE DI BIOINGEGNERIA – Bressanone – September 12, 2018

Design, Implementation and First Results of the Future Standard for Evaluation of PET-AS Methods, 30th Annual Congress of the European Association of Nuclear Medicine (EANM'17), October 25, 2017, Vienna, Austria

Biomedical Image Segmentation, International workshop on imaging, Varenna, Italy, September 4th 2017

#### PEER-REVIEW ACTIVITY

Medical Physics, Physics in Medicine and Biology, European Journal of Nuclear Medicine and Molecular Imaging, Medical Image Analysis, Physica Medica, Annals of Nuclear Medicine, IEEE Transactions on Image Processing, Journal of Imaging, Cancer Imaging, Computers in Medicine and Biology, Computational and

Mathematical Methods in Medicine, Cancer Medicine, Medical and Biological Engineering and Computing, Measurement, Entropy, Journal of Clinical Medicine, Frontiers in Nuclear Medicine.

#### PARTICIPATION TO RESEARCH PROJECTS

11/2019 -04/2022: IMMUN HUB, ID 1165235, Sviluppo di nuove molecole di seconda generazione per immunoterapia oncologica

07/2020 - 12/2021: NanoCosPha, Infrastruttura Regionale Lombarda, Nanotecnologie per la medicina personalizzata e i trattamenti di salute e cura estetica

11/2018 - 09/2021: ARS01\_00144 PON 2014-2020, MOLIM ONCOBRAIN LAB, Metodi innovativi di imaging molecolare per lo studio di malattie oncologiche e neurodegenerative

2013-2016: PRIN 2010JMMZLY\_003

2011 – 2012: PRIN 2008CBBWBF\_004

2010-2011: New-Generation Fluorinated Materials as Smart Reporter Agents in 19F MRI; Cariplo Foundation

#### AWARDS AND AKNOWLEDGEMENTS

2017: abstract “18F-FDG PET/CT radiomics in endometrial cancer” accepted at 30th Annual Congress of the European Association of Nuclear Medicine (EANM’17), October 2017, Vienna, Austria, as one of the year’s best presentations submitted for the specific topic/track.

2003: Award for one of the best master thesis given by the National Group of Bioengineering in Bressanone

#### PUBLICATIONS

1. “Validation on an anthropomorphic phantom of FORE optimization in 3D PET”, E. De Bernardi, M. Mazzoli, F. Zito, G. Baselli, Nuclear Instruments and Methods in Physics Research A, 571 (2007) 247-250, ISSN 0168-9002.

2. “Analysis of different detector and electronics defects on 18F-FDG images”, F. Zito, E. De Bernardi, M. Schiavini, C. Canzi, F. Voltini, S. Agosteo, P. Gerundini, Nuclear Instruments and Methods in Physics Research A, 571 (2007) 493-497.

3 “Evaluation of frequency-distance relation validity for FORE optimization in 3D PET”, E. De Bernardi, M. Mazzoli, F. Zito, G. Baselli, IEEE Transactions on Nuclear Science, 54 (5) (2007) 1670-1678, ISSN 0018-9499.

4. “Resolution recovery in PET during AWOSEM reconstruction: a performance evaluation study”, E. De Bernardi, M. Mazzoli, F. Zito, G. Baselli, IEEE Transaction on Nuclear Science, 54 (5) (2007) 1626-1638, ISSN 0018-9499.

5. “Lesion quantification in oncological Positron Emission Tomography: a maximum likelihood partial volume correction strategy”, E. De Bernardi, E. Faggiano, F. Zito, P. Gerundini, G. Baselli, Medical Physics, 36 (7), (2009), 3040-3049, ISSN 0094-2405.

6. “ML segmentation strategies for object interference compensation in FDG-PET lesion quantification”, E. De Bernardi, F. Fiorani Gallotta, C. Gianoli, F. Zito, P. Gerundini, G. Baselli, Methods of Information in Medicine, 49 (4), (2010), ISSN: 0026-1270.

7. “The use of zeolites to generate PET phantoms for the validation of quantification strategies in oncology”, F. Zito, E. De Bernardi, C. Soffientini, C. Canzi, R. Casati, P. Gerundini, G. Baselli, Medical Physics, 39 (9), (2012), 5353-5361, ISSN: 0094-2405.

8. "Motion-Tracking Hardware and Advanced Applications in PET and PET/CT", V. Bettinardi, E. De Bernardi, L. Presotto, M.C. Gilardi, *PET Clinics*, 8 (1), (2013), 11-28, ISSN 1556-8598.
9. "Optimization of rapid acquisition with relaxation enhancement (RARE) pulse sequence parameters for 19F-MRI studies", A. Mastropietro, E. De Bernardi, G. Breschi, I. Zucca, M. Cametti, C. Soffientini, M. de Curtis, G. Terraneo, P. Metrangolo, R. Spreafico, G. Resnati, G. Baselli, *Journal of Magnetic Resonance Imaging*, 40(1), (2014) 162-170, ISSN: 1522-2586.
10. "PET-CT scanner characterization for PET raw data use in biomedical research", Gianoli, C., Riboldi, M., Kurz, C., De Bernardi, E., Bauer, J., Fontana, G., & Baroni, G., *Computerized Medical Imaging and Graphics*, (2014), 38(5) Jul, 358-368.
11. "Optimized Bayes variational regularization prior for 3D PET images", Rapisarda, E., Presotto, L., De Bernardi, E., Gilardi, M. C., & Bettinardi, V., *Computerized Medical Imaging and Graphics* (2014), 38(6), 445-457.
12. "PET quantification: strategies for partial volume correction", V. Bettinardi, I. Castiglioni, E. De Bernardi, M.C. Gilardi, *Clin Transl Imaging*, (2014) 2(3):199–218.
13. "Regional MLEM reconstruction strategy for PET-based treatment verification in ion beam radiotherapy", C. Gianoli, J. Bauer, M. Riboldi, E. De Bernardi, G. Fattori, G. Baselli, J. Debus, K. Parodi, G. Baroni, *Physics in Medicine and Biology*, (2014), 59(22), 6979-6995.
14. "Regularized ML reconstruction for time/dose reduction in 18F-fluoride PET/CT studies", E. De Bernardi, P. Magnani, L. Gianolli, M.C. Gilardi and V. Bettinardi, *Physics in Medicine and Biology*, (2015), 60(1), 67.
15. "4D ML Reconstruction as a tool for volumetric PET-based Treatment Verification in Ion Beam Radiotherapy", E. De Bernardi, R. Ricotti, M. Riboldi, G. Baroni, K. Parodi, C. Gianoli, *Med. Phys.*, (2016), 43(2), 710-726.
16. "Background based Gaussian mixture model lesion segmentation in PET", C. D. Soffientini, E. De Bernardi, F. Zito, M. Castellani, G. Baselli, *Med. Phys.*, (2016), 43 (5), 2662-2675.
17. "Technical Note: A new zeolite PET phantom to test segmentation algorithms on heterogeneous activity distributions featured with ground-truth contours", C.D. Soffientini, E. De Bernardi, R. Casati, G. Baselli, F. Zito, *Med. Phys.*, (2017), 44(1), 221-226.
18. "Reconstruction of uptake patterns in PET: the influence of regularizing priors", E. De Bernardi, F. Fallanca, L. Gianolli, M.C. Gilardi, V. Bettinardi, *Medical Physics*, (2017), 44(5), 1823-1836.
19. "Classification and evaluation strategies of auto-segmentation approaches for PET: Report of AAPM Task Group No. 211", M. Hatt, J. Lee, C.R. Schmidlein, I. El Naqa, C. Caldwell, E. De Bernardi, W. Lu, S. Das, X. Geets, V. Gregoire, R. Jeraj, M.P. MacManus, O. R. Mawlawi, U. Nestle, A. B. Pugachev, H. Schöder, T. Shepherd, E. Spezi, D. Visvikis, H. Zaidi, A. S. Kirov, *Med. Phys.*, (2017), 44(6), e1-e42.
20. "First clinical investigation of a 4D maximum likelihood reconstruction for 4D PET-based treatment verification in ion beam therapy", C. Gianoli, E. De Bernardi, R. Ricotti, C. Kurz, J. Bauer, M. Riboldi, G. Baroni, J. Debus, K. Parodi, *Radiotherapy and Oncology*, (2017), 123(3), 339-345.
21. "Towards a standard for the evaluation of PET Auto-Segmentation methods: requirements and implementation", B. Berthon, E. Spezi, P. Galavis, T. Shepherd, A. Apte, M. Hatt, H. Fayad, E. De Bernardi, C. Soffientini, C.R. Schmidlein, I. El Naqa, R. Jeraj, W. Lu, S. Das, H. Zaidi, O.R. Mawlawi, D. Visvikis, J.A. Lee, A.S. Kirov, *Med. Phys.*, (2017), 44(8), 4098-4111.

22. "PET textural features stability and pattern discrimination power for radiomics analysis: An "ad-hoc" phantoms study", L. Presotto, V. Bettinardi, E. De Bernardi, M. Belli, G. Cattaneo, S. Broggi, C. Fiorino, *Physica Medica*, (2018), 50, pp.66-74. doi:10.1016/j.ejmp.2018.05.024.
23. "Radiomics of the primary tumour as a tool to improve 18F-FDG-PET sensitivity in detecting nodal metastases in endometrial cancer", E. De Bernardi, A. Buda, L. Guerra, D. Vicini, F. Elisei, C. Landoni, R. Fruscio, MC. Messa, C. Crivellaro, *EJNMMI Research*, (2018), 8(1), pp. XX. doi: 10.1186/s13550-018-0441-1.
24. "Combining positron emission tomography/computed tomography, radiomics, and sentinel lymph node mapping for nodal staging of endometrial cancer patients", C Crivellaro, C Landoni, F Elisei, A Buda, M Bonacina, T Grassi, L Monaco, D Giuliani, I Gotuzzo, S Magni, G Di Martino, M Delle Marchette, L Guerra, F Landoni, R Fruscio, C Messa, E De Bernardi, *International Journal of Gynecologic Cancer*, (2020), 30:378-382, doi: 10.1136/ijgc-2019-000945
25. "Imaging Metformin Efficacy as Add-On Therapy in Cells and Mouse Models of Human EGFR Glioblastoma", Silvia Valtorta, Alessia Lo Dico, Isabella Raccagni, Cristina Martelli, Valentina Pieri, Paolo Rainone, Sergio Todde, Bastian Zinnhardt, Elisabetta De Bernardi, Angela Coliva, Letterio S Politi, Thomas Viel, Andreas H Jacobs, Rossella Galli, Luisa Ottobrini, Valentina Vaira, Rosa Maria Moresco, *Frontiers in Oncology* (2021), Vol 11, 6641-6649.
26. "A Simple Contrast Matching Rule for OSEM Reconstructed PET Images with Different Time of Flight Resolution", Luca Presotto, Valentino Bettinardi, Elisabetta De Bernardi, *Applied Sciences* (2021), 11(16),
27. "Artificial intelligence for precision medicine in autoimmune liver disease", Alessio Gerussi, Miki Scaravaglio, Laura Cristoferi, Damiano Verda, Chiara Milani, Elisabetta De Bernardi, Davide Ippolito, Rosanna Asselta, Pietro Invernizzi, Jakob Nikolas Kather, Marco Carbone, *Frontiers in Immunology*, (2022), 13.
28. "Evaluation of a 2D UNet-based attenuation correction methodology for PET/MR brain studies", Luca Presotto, Valentino Bettinardi, Matteo Bagnalasta, Paola Scifo, Annarita Savi, Emilia Giovanna Vanoli, Federico Fallanca, Maria Picchio, Daniela Perani, Luigi Gianolli, Elisabetta De Bernardi, *Journal of Digital Imaging*, (2022), 35(3), 432-445.
29. "The "digital biopsy" in non-small cell lung cancer (NSCLC): a pilot study to predict the PD-L1 status from radiomics features of [18F] FDG PET/CT", Lavinia Monaco, Elisabetta De Bernardi, Francesca Bono, Diego Cortinovis, Cinzia Crivellaro, Federica Elisei, Vincenzo L'Imperio, Claudio Landoni, Gregory Mathoux, Monica Musarra, Fabio Pagni, Elia Anna Turolla, Cristina Messa, Luca Guerra, *European Journal of Nuclear Medicine and Molecular Imaging*, (2022), 49(10), 3401-3411.
30. "Radiomics in PI-RADS 3 Multiparametric MRI for Prostate Cancer Identification: Literature Models Re-Implementation and Proposal of a Clinical–Radiological Model", Andrea Corsi, Elisabetta De Bernardi, Pietro Andrea Bonaffini, Paolo Niccolò Franco, Dario Nicoletta, Roberto Simonini, Davide Ippolito, Giovanna Perugini, Mariaelena Occhipinti, Luigi Filippo Da Pozzo, Marco Roscigno, Sandro Sironi, *Journal of Clinical Medicine* (2022), 11(21), 6304.
31. "Towards the Definition of Radiomic Features and Clinical Indices to Enhance the Diagnosis of Clinically Significant Cancers in PI-RADS 4 and 5 Lesions", Bonaffini, P. A., De Bernardi, E., Corsi, A., Franco, P. N., Nicoletta, D., Muglia, R., Perugini, G., Roscigno, M., Occhipinti, M., Da Pozzo, L.F., Sironi, S. (2023), *Cancers*, 15(20), 4963.
32. "Radiomics and liver: Where we are and where we are headed?", Cesare Maino, Federica Vernuccio, Roberto Cannella, Paolo Niccolò Franco, Valentina Giannini, Michele Dezio, Antonio Rosario Pisani, Antonino Andrea Blandino, Riccardo Faletti, Elisabetta De Bernardi, Davide Ippolito, Marco Gatti, Riccardo Inchingolo, *European Journal of Radiology*, Volume 171, (2024), 111297, <https://doi.org/10.1016/j.ejrad.2024.111297>.

33. "A ROI-based quantitative pipeline for 18F-FDG PET metabolism and pCASL perfusion joint analysis: Validation of the 18F-FDG PET line", Cerina, V., Crivellaro, C., Morzenti, S., Pozzi, F. E., Bigiogera, V., Jonghi-Lavarini, L., Moresco, R.M., Basso, G., De Bernardi, E. (2024), Heliyon, 10(1).

#### BOOK CHAPTERS

"Evoluzione della diagnostica per immagini", M.C. Messa, C. Crivellaro, E. De Bernardi, in "La bioingegneria per il benessere e l'invecchiamento attivo", Collana: Gruppo nazionale bioingegneria, congressi e seminari, Patron, 2016.

"Metodi di segmentazione avanzata: applicazioni in oncologia", E. De Bernardi, K. Passera, M. Riboldi, in "Immagini biomediche: nuove tendenze in tecnologia metodi e applicazioni", Baselli G., Gilardi M.C., Landini L., Magenes G., Pàtron editore, 2018. ISBN 9788855534277.