

Team Activity Report – 2022 (Period: 01.01 - 31.12)

Deadline: January 25th, 2023

Unit	U1288
Team	Laboratory of Translational Imaging in Oncology (LITO)
Team leader	Irène Buvat
Title (Pr or Dr)	DR1 CNRS
Label (ex: Ligue, Labex, ATIP-Avenir,...)	n/a
Researcher unique identifier(s) (such as ORCID, Research ID, etc.)	ORCID: 0000-0002-7053-6471
SCIENTIFIC PRODUCTION	
List of Publications indicating -Impact factor (IF) if known -DOI	1. Saboury B, Bradshaw T, Boellaard R, Buvat I, Dutta J, Hatt M, Jha AK, Li Q, Liu C, McMeekin H, Morris MA, Scott PJH, Siegel E, Sunderland JJ, Wahl RL, Zuehlsdorff S, Rahmim A. Toward Trustworthy Artificial Intelligence Ecosystems: Opportunities, Challenges, and Responsibilities in Nuclear Medicine. J Nucl Med, in press, 2022. DOI: 10.2967/jnumed.121.263703. IF=11.082 2. Beddok A, Orlhac F, Calugaru V, Champion L, Ala Eddine C, Nioche C, Crehange G, Buvat I. [18F]-FDG PET and MRI radiomic signatures to predict the risk and the location of tumor recurrence after re-irradiation in head and neck cancer. Eur J Nucl Med Mol Imaging, in press, 2022. DOI: 10.1007/s00259-022-06000-7. IF=10.057 3. Saint Martin MJ, Frouin F, Malhaire C, Orlhac F. Decrypting the information captured by MRI-radiomic features in predicting the response to neoadjuvant chemotherapy in breast cancer. 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), 3227-3230, 2022. DOI: 10.1109/EMBC48229.2022.9871844. No IF. 4. Rebaud L, Escobar T, Khalid F, Girum K, Buvat I. Head and Neck Tumor and Lymph Node Segmentation and Outcome Prediction from 18F-FDG PET/CT Images: Simplicity is All You Need. In: Lecture Notes in Computer Science (LNCS) Challenges (under review). 5. Thomas CD, Lupu M, Poyer F, Maillard P, Mispelter J. Increased PDT efficacy when associated with nitroglycerin: a study of retinoblastoma xenografts on mice. Pharmaceuticals, 15(8):985, 2022. DOI: 10.3390/ph15080985 IF=5.215 6. Rahimpour M, Saint Martin MJ, Frouin F, Akl P, Orlhac F, Koole M, Malhaire C. Visual ensemble selection of deep convolutional neural networks for 3D segmentation of breast tumors on dynamic contrast enhanced MRI. Eur Radiol, in press, 2022. DOI: 10.1007/s00330-022-09113-7 IF=7.034 7. Beddok A, Saint-Martin C, Ala Eddine C, Champion L, Krhili S, Chilles A, Catteau L, Goudjil F, Zefkili S, Amessis M, Peurien D, Choussy O, Le Tourneau C, Klijanienko J, Dendale R, Buvat I, Créhange G, Calugaru V. Curative high-dose reirradiation for patients with recurrent head and neck squamous cell carcinoma using IMRT or proton therapy: Outcomes and Analysis of patterns of failure. Head & Neck, 44(11):2452-2464, 2022. DOI: 10.1002/hed.27153. IF=3.821 8. Beddok A, Guzene L, Coutte A, Thomson D, Yom SS, Calugaru V, Blais E, Gilliot O, Racadot S, Pointreau Y, Corry J, Jensen K, Porceddu S, Khalladi N,

- Bastit V, Lasne-Cardon A, Marcy PY, Carsuzaa F, **Nioche C**, Bourhis J, Salleron J, Thariat J; GORTEC. International assessment of interobserver reproducibility of flap delineation in head and neck carcinoma. *Acta Oncol*. 61(6):672-679, 2022. DOI: 10.1080/0284186X.2022.2036367. **IF=4.311**
9. Guzene L, **Beddok A**, **Nioche C**, Modzelewski R, Loiseau C, Salleron J, Thariat J. Assessing Interobserver Variability in the Delineation of Structures in Radiation Oncology: A Systematic Review. *Int J Radiat Oncol Biol Phys*. S0360-3016(22)03551-9, 2022. DOI: 10.1016/j.ijrobp.2022.11.021. **IF=8.013**
 10. Guardiola C, Bachiller-Perea D, Kole EMM, Fleta C, Quirion D, **De Marzi L**, Gómez F. First experimental measurements of 2D microdosimetry maps in proton therapy. *Med Phys*. In press, 2022. DOI: 10.1002/mp.15945. **IF=4.506**
 11. **Beddok A**, Lahaye C, Calugaru V, **De Marzi L**, Fouillade C, Salvador S, Fontbonne JM, Favaudon V, Thariat J. A Comprehensive Analysis of the Relationship Between Dose Rate and Biological Effects in Preclinical and Clinical Studies, From Brachytherapy to Flattening Filter Free Radiation Therapy and FLASH Irradiation. *Int J Radiat Oncol Biol Phys*. 113(5):985-995, 2022. DOI: 10.1016/j.ijrobp.2022.02.009. **IF=8.013**
 12. Porte J, Saint-Martin C, Frederic-Moreau T, Massiani MA, Bozec L, Cao K, Verrelle P, Otz J, Jadaud E, Minsat M, Langer A, Girard N, **Créange G**, **Beddok A**. Efficacy and Safety of Combined Brain Stereotactic Radiotherapy and Immune Checkpoint Inhibitors in Non-Small-Cell Lung Cancer with Brain Metastases. *Biomedicines*. 10(9):2249, 2022. DOI: 10.3390/biomedicines10092249. **IF=4.757**
 13. **Beddok A**, Scher N, Alapetite C, Baussart B, Bentahila G, Bielle F, Bolle S, Dendale R, Dureau S, Goudjl F, Helfre S, Mammar H, Nichelli L, Calugaru V, Feuvret L. Protontherapy for adult craniopharyngioma: experience of a single institution in 91 consecutive patients. *Neuro Oncol*. In press, 2022. DOI: 10.1093/neuonc/noac210. **IF=13.029**
 14. **Beddok A**, Chabi-Charvillat ML, Kennel T, de Wolf J, Pricopi C, Crequit P, Girard N, Otz J, Vallée A, Longchamp E, Sage E, Glorion M. Prospective Radiologic-Pathologic Correlation of Macroscopic Volume and Microscopic Extension of Nonsolid Lung Nodules on Thin-section CT Images for Sublobar Resection and Stereotactic Radiotherapy Planning. *Clin Lung Cancer*. 2022 Nov 9:S1525-7304(22)00243-1. DOI: 10.1016/j.clcc.2022.11.001. **IF=4.84**
 15. Bauer J, Hildebrandt M, Baumgartl M, Fiedler F, Robert C, **Buvat I**, Enghardt W, Parodi K. Quantitative assessment of radionuclide production yields in in-beam and offline PET measurements at different proton irradiation facilities. *Phys Med Biol*, 14;67(15). DOI: 10.1088/1361-6560/ac7a89. **IF=4.174**
 16. Durmo R, Donati B, **Rebaud L**, **Cottureau AS**, Ruffini A, Nizzoli M, Ciavarella S, Vegliante M, **Nioche C**, Meignan M, Merli F, Versari A, Ciarrocchi A, **Buvat I**, Luminari S. Prognostic value of lesion dissemination in ABVD-treated, iPET-negative cHL patients: a radio-genomic study. *Hemat Oncol*. 40(4):645-657, 2022. DOI: 10.1002/hon.3025. **IF=4.850**
 17. Jha AK, Bradshaw TJ, **Buvat I**, Hatt M, Kc P, Liu C, Obuchowski NF, Saboury B, Slomka PJ, Sunderland JJ, Wahl RL, Yu Z, Zuehlsoedorf S, Rahmim A, Boellaard R. Nuclear Medicine and Artificial Intelligence: Best Practices for Evaluation (the RELAINCE guidelines). *J Nucl Med*. 63: 1288-1299, 2022. DOI: <https://doi.org/10.2967/jnumed.121.263239>. **IF=11.082**
 18. Guesdon-Vennerie A, Couvreur P, Ali F, **Pouzoulet F**, Roulin C, Martínez-Rovira I, Bernadat G, Legrand FX, Bourgaux C, Mazars C, Marco S, Trépout

- S, Mura S, Mériaux S, Bort G. Breaking photoswitch activation depth limit using ionising radiation stimuli adapted to clinical application. *Nat Comm.* 13(1):4102. DOI: 10.1038/s41467-022-30917-0. **IF=17.69**
19. **Girum KB, Rebaud L, Cottureau AS**, Meignan M, Clerc J, Vercellino L, Casasnovas O, Morschhauser F, Thieblemont C, **Buvat I**. 18F-FDG PET maximum intensity projections and artificial intelligence: a win-win combination to easily measure prognostic biomarkers in DLBCL patients. *J Nucl Med* 63(12):1925-1932. DOI:10.2967/jnumed.121.263501. **IF=11.082**.
 20. Comte V, Schmutz H, Humbert O, **Orlhac F**, Chardin D, Darcourt J. Development and validation of a radiomic model for the diagnosis of dopaminergic denervation on [18F]FDOPA PET/CT. *Eur J Nucl Med Mol Imaging*. 49(11):3787-3796. 2022. DOI: 10.1007/s00259-022-05816-7 **IF=10.057**
 21. Peltier A, **Seban R, Buvat I**, Bidard FC, Mechta-Grigoriou F. Fibroblast heterogeneity in solid tumors: from single cell analysis to whole-body imaging. *Semin Cancer Biol.* 86(Pt 3):262-272, 2022. DOI: 10.1016/j.semcancer.2022.04.008 **IF=17.012**
 22. Dal Toso L, Chalampalakis Z, **Buvat I**, Comtat C, Cook G, Goh V, Schnabel JA, Marsden PK. Improved 3D Tumour Definition and Quantification of Uptake in Simulated Lung Tumours Using Deep Learning. *Phys Med Biol.* 67:095013, 2022. DOI: 10.1088/1361-6560/ac65d6 **IF=4.174**
 23. **Beddok A**, Kirova Y, Laki F, Reyat F, Vincent Salomon A, **Servois V**, Fourquet A. The place of the boost in the breast cancer treatment: State of art. *Radiother Oncol.* 2022 May;170:55-63. doi: 10.1016/j.radonc.2022.03.010. **IF=6.901**
 24. **Créange G**, Goudjil F, Khili SL, Minsat M, **de Marzi L**, Dendale R. The role of proton therapy in esophageal cancer. *Cancer radiotherapie* 26(4):602-610, 2022. DOI: <https://doi.org/10.1016/j.canrad.2021.08.015> **IF=1.217**
 25. **Beddok A**, Calugaru V, **de Marzi L**, Graff P, Dumas JL, Goudjil F, Dendale R, Minsat M, Verrelle P, **Buvat I**, Créange G. Clinical and technical challenges of cancer reirradiation: Words of wisdom. *Crit Rev Oncol Hematol.* 174:103655, 2022. DOI: 10.1016/j.critrevonc.2022.103655 **IF=6.625**
 26. **Escobar T**, Vauclin S, **Orlhac F, Nioche C**, Pineau P, **Champion L, Brisse H, Buvat I**. Voxel-wise supervised analysis of tumors with multimodal engineered features to highlight interpretable biological patterns. *Med Phys.* 49(6):3816-3829, 2022. DOI: 10.1002/mp.15603 **IF=4.506**
 27. **Wallis D, Buvat I**. Clever Hans effect found in a widely used brain tumour MRI dataset. *Med Image Anal.* 77:102368, 2022. DOI: 10.1016/j.media.2022.102368 **IF=13.828**
 28. Cardoen L, Tauziède-Espariat A, Dangouloff-Ros V, Moalla S, Nicolas N, Roux CJ, Bouchoucha Y, Bourdeaut F, Beccaria K, Bolle S, Pierron G, Dufour C, Doz F, Boddaert N, **Brisse HJ**. Imaging Features with Histopathologic Correlation of CNS High-Grade Neuroepithelial Tumors with a *BCOR* Internal Tandem Duplication. *AJNR Am J Neuroradiol.* 43:151-156, 2022. DOI: 10.3174/ajnr.A7367. **IF=4.966**
 29. **Seban RD**, Richard C, Nascimento-Leite C, Ghidaglia J, **Provost C**, Gonin J, Le Tourneau C, Romano E, Deleval N, **Champion L**. Absolute lymphocyte count after COVID-19 vaccination is associated with vaccine-induced hypermetabolic lymph nodes on ¹⁸F-FDG PET/CT: a focus in breast cancer care. *J Nucl Med.* 63: 1231-1238, 2022. DOI: 10.2967/jnumed.121.263082. **IF=11.082**
 30. Loap P, **De Marzi L**, Almeida CE, Barcellini A, Bradley J, de Santis MC, Dendale R, Jimenez R, Orlandi E, Kirova Y. Hadrontherapy techniques for

	breast cancer. Crit Rev Oncol Hematol. 169:103574, 2022. DOI: 10.1016/j.critrevonc.2021.103574. IF=6.625 31.Ortiz R, De Marzi L, Prezado Y. Proton Minibeam Radiation Therapy and Arc Therapy: Proof of Concept of a Winning Alliance. Cancers (Basel). 14(1):116, 2022. DOI: 10.3390/cancers14010116. IF=6.575 32.Cavallone M, Prezado Y, De Marzi L. Converging Proton Minibeams with Magnetic Fields for Optimized Radiation Therapy: A Proof of Concept. Cancers (Basel). 14(1):26, 2022. DOI: 10.3390/cancers14010026. IF=6.575 33.Bradshaw TJ, Boellaard R, Dutta J, Jha AK, Jacobs P, Li Q, Liu C, Sitek A, Saboury B, Scott PJH, Slomka PJ, Sunderland JJ, Wahl RL, Yousefirizi F, Zuehlsdorff S, Rahmim A, Buvat I. Nuclear Medicine and Artificial Intelligence: Best Practices for Algorithm Development. J Nucl Med. 63(4):500-510, 2022. DOI: https://doi.org/10.2967/jnumed.121.262567. IF=11.082 34.Kolinger GD, García DV, Kramer GM, Frings V, Zwezerijnen GJC, Smit EF, De Langen AJ, Buvat I, Boellaard R. Effects of tracer uptake time in non-small cell lung cancer ¹⁸F-FDG PET radiomics. J Nucl Med. 63(6):919-924, 2022. DOI: 10.2967/jnumed.121.262660 IF=11.082 35.Orlhac F, Eertink JJ, Cottreau AS, Zijlstra JM, Thieblemont C, Meignan M, Boellaard R, Buvat I. A guide to ComBat harmonization of imaging biomarkers in multi center studies. J Nucl Med. 63(2):172-179, 2022. DOI: https://doi.org/10.2967/jnumed.121.262464 IF=11.082 36.Wallis D, Soussan M, Lacroix M, Akl P, Dubouchier C, Buvat I. An FDG-PET/CT deep learning method for fully automated detection of pathological mediastinal lymph nodes in lung cancer patients. Eur J Nucl Med Mol Imaging. 49(3):881-888, 2022. DOI: https://doi.org/10.1007/s00259-021-05513-x IF=10.057 37.Perret P, Slimani L, Barone-Rochette G, Voltaire J, Briat A, Ahmadi M, Henri M, Desruet MD, Clerc R, Broisat A, Riou L, Boucher F, Frouin F, Djaileb L, Calizzano A, Vanzetto G, Fagret D, Ghezzi, C. Preclinical and clinical evaluation of a new method to assess cardiac insulin resistance using nuclear imaging. J Nucl Cardiol. 29:1419–1429, 2022. DOI: 10.1007/s12350-020-02520-7 IF=3.872 38.Hahn C, Ödén J, Dasu A, Vestergaard A, Fuglsang Jensen M, Sokol O, Pardi C, Bourhaleb F, Leite A, de Marzi L, Smith E, Aitkenhead A, Rose C, Merchant M, Kirkby K, Grzanka L, Pawelke J, Lühr A. Towards harmonizing clinical linear energy transfer (LET) reporting in proton radiotherapy: a European multi-centric study. Acta oncologica, 61:206-214, 2022. DOI: https://doi.org/10.1080/0284186X.2021.1992007 IF=4.311 39.Leite AMM, Cavallone M, Ronga MG, Trompier F, Patriarca A, De Marzi L. Ion recombination correction factors and benchmark of detectors in a very-high dose rate proton scanning beam. Physica Medica, in press, 2023. DOI: https://doi.org/10.1016/j.ejmp.2022.102518 IF=3.119
H factor for team leader and average citation index, indicating source (Webscience, etc.)	Irène Buvat H-index Web of Science Core Collection = 44 Average citation index (articles only, abstracts excluded) Web of science = 57.7 H-index google scholar = 51 Total number of citations google scholar = 17397, Web of Science = 10757
List of Patents -Title -Reference N° -Date	- Development of an original method for automatic deep learning calculation of prognostic biomarkers from PET "Maximum Intensity Projections" images (Girum K, Buvat I, patentability study by Inserm Transfert, application n°22305747.2, 2022)

-List of people involved	
List of scientific highlights in 2022 (Publication or other) - 5 max.	1. Development of a radiomic model with binary weights, winner of the prediction task of the international HECKTOR challenge presented at the MICCAI 2022 conference in Singapore. 2. Development of an original method for automatic calculation of prognostic biomarkers by deep learning from PET "Maximum Intensity Projections" images (Girum et al 2022, on-going patentability study by Inserm Transfert, application n°22305747.2). 3. Participation in the Artificial Intelligence Task Force of the American Society of Nuclear Medicine and Molecular Imaging (SNMMI) and production of 3 publications of recommendations in J Nucl Med (Bradshaw et al, Jha et al, Saboury et al 2022). 4. Start of the RHU Cassopeia 2022-2027. 5. Three new ANR grants, 1 PHRC-I and 2 PRT-K funded this year.
Other written productions of the team (e.g.: book chapter, etc.) - 5 max.	Orlhac F, Buvat I, 2022. «L'IA en imagerie médicale pour la cancérologie». In Nordlinger B, Villani C, de Frenoye O. Médecine et Intelligence Artificielle, Paris: CNRS Editions, ISBN 978-2-271-14153-8, pages 51-58.
List of software developed -Name -Version -Release date	1. LIFEx: https://lifexsoft.org/index.php/product/overview-of-versions Two official releases in 2022: 7.2.0 (1/3/2022) et 7.3.0 (20/9/2022). More than 6300 users in the word end of 2022. 2. ai4elife, Automatic segmentation of PET images from their maximum intensity projections (MIPs) and inference of two predictive biomarkers: total tumor volume and tumor dissemination https://github.com/KibromBerihu/ai4elife, MIT License. 07/2022. 3. ICARE: Risk estimation model from radiomic and clinical data https://github.com/Lrebaud/ICARE Apache License 2.0. 09/2022.
List of startup -Name -Date of creation -Team members	n/a
ORGANIZATION OF SCIENTIFIC MEETINGS - INSTITUTIONAL RESPONSABILITIES	
List of invitations to meetings and seminars (in France or international) -Meeting title -Date -Place -Presentation title -Authors	1. Cutting edge computations in Nuclear Medicine symposium. Institute of Physics and Engineering in Medicine. Virtual. January 2022. Radiomics in Nuclear Medicine: the good, the bad and the ugly. Buvat I. 2. SNMMI Artificial Intelligence summit. Bethesda. March 2022. State of the art in Artificial Intelligence in Nuclear Medicine and Molecular Imaging. Buvat I. 3. 8è JFMN. Montrouge (France). March 2022. Session 4 Place de la TEP au 18FDG dans le CBPNPC traité par immunothérapie. Seban RD. 4. Club ARIAS, Siemens: Thématique: Oncologie et Intelligence Artificielle. Mars 2022. Paris (France). Radiothérapie. Créhange G, Ferrad R, Buvat I. 5. Nationaler Kongress der Österreichische Gesellschaft für Nuklearmedizin und Molekulare Bildgebung (OGNMB). May 2022. Bad Ischl (Austria). Artificial Intelligence and Nuclear Medicine, Buvat I. 6. 21st Symposium of the Belgian Society of Nuclear Medicine. Antwerp (Belgique) May 2022. How to play Radiomics? Orhac F. 7. 21st Symposium of the Belgian Society of Nuclear Medicine. Antwerp (Belgium) May 2022. The technical and methodological aspects of AI. Buvat I.

	8. 60èmes Journées Scientifiques de la Société Française de Physique Médicale 2022. June 2022. Avignon (France). Radiomique : état de l'art, précautions, perspectives. Buvat I. 9. EANM Multidisciplinary days. June 2022. Virtual. Direct reconstruction of quantitative parametric maps. Buvat I. 10. EANM Multidisciplinary days. June 2022. Virtual. The Use of Radiomics – What is it and How it Works. Buvat I. 11. EANM Multidisciplinary days. June 2022. Virtual. Traps and Deception of Artificial Intelligence in Research. Buvat I. 12. Artificial Intelligence 4 Imaging. Maastricht (The Netherlands) June 2022. The current state of feature harmonization. Orlhac F. 13. SNMMI meeting. June 2022. Vancouver (Canada). Summary Session Data Analysis and Management: latest developments presented at the SNMMI annual meeting. Buvat I. 14. SNMMI meeting. June 2022. Vancouver (Canada). Artificial intelligence in nuclear medicine and molecular imaging. Keynote speaker of the AI Integrated Session. Buvat I. 15. 4th European Congress of Medical Physics. August 2022. Dublin (Ireland). AI in Nuclear Medicine. Buvat I. 16. 7th Mediterranean Thematic Workshop in Advanced Molecular Imaging. September 2022. Portoroz, Slovenia. Radiomics in brain imaging. Buvat I. 17. ESMPE School for Artificial Intelligence in Medical Physics. Virtual. September 2022. Challenges for multi-centers radiomics studies: features robustness analysis and AI support methods to harmonize data. Orlhac F. 18. PET is wonderful meeting. September 2022. Edinburgh (Scotland). Radiomics and artificial intelligence applied to PET imaging: principles and applications. Buvat I. 19. Total Body PET meeting. September 2022. Edimbourg (Scotland). Latest advances in deep learning techniques applied to large PET imaging datasets. Buvat I. 20. 12th Hodgkin Symposium. October 2022. Cologne (Germany). Latest development in software and PET technologies. Buvat I. 21. European Society of Radiology. Master Class in AI. October 2022. Virtual. LIFEx, Pyradiomics, etc. Buvat I. 22. Journées Françaises de Radiology. Octobre 2022. Paris (France). Radiomique : où en est-on vraiment ? Buvat I. 23. European Association of Nuclear Medicine meeting (EANM). October 2022. Barcelona (Spain). Making it Quicker - Automated and AI Methods for Image Segmentation. Buvat I. 24. Memorial Sloan Kettering Cancer Center. Invited Seminar. November 2022. New York (USA). Radiomics and artificial intelligence in PET imaging: beyond promises. Buvat I. 25. CHILI 4: Conference in Hybrid Imaging live, European Society of Hybrid, Molecular and Translational Imaging. November 2022. Vienne (Austria). Artificial intelligence in multimodality hybrid imaging. Buvat I. 26. 4th International Conference on Medical Imaging and Therapeutics. Virtual. Dec 2022. A Dedicated Pipeline to Predict Response to Neoadjuvant Chemotherapy in Breast Cancer Using MRI Acquired in Various Centers. Frouin F.
List of organized meetings, workshops, seminars (indicate if at Curie, in France or international) <i>-Meeting title</i>	1. International: Society of Nuclear Medicine meeting 2022, June 2022, Vancouver. Organization of the “Physics, Instrumentation & Data Sciences” session building. Irène Buvat. 2. International: European Congress of Radiology, March 2022, Vienna. Irène Buvat, member of the organization committee.

-Date -Place -Presentation title -Authors	- At Curie: Webinar LITO: 17 janvier 2022, Hervé Isambert (UMR 168) Learning interpretable networks from large scale biological and clinical data. Frédérique Frouin, organizer. - At Curie: Webinar LITO: 12 avril 2022, Lalith Kumar Shiyam Sundar (Medical University of Vienna). ENHANCE: A software zoo for exploring the human functional connectome using whole-body PET. Frédérique Frouin, organizer.
Public outreach (TV, radio, press...), specify if PI or Team members name: -Topic -Audience (eg. Researchers, general public) -Media -Date	- Regular contributions to “L’essential”, the Curie journal, Irène Buvat. - ARTE Web-series regarding scientific of exception and what Marie Curie brought to medicine. August 2022. Irène Buvat. - Sciences et Avenir. Article Santé Globale : Les futurs défis de l’intelligence artificielle en Médecine. November 2022. Irène Buvat. - Les rencontres Santé de la Région Grand-Est. Santé Globale : le nouveau défi. November 2022. Participation to a round table. Irène Buvat. - Dossier Grand Angle : Cancers – Mieux comprendre pour mieux les traiter. Researchers. Inserm, le magazine n°55, December 2022. Irène Buvat. - Healthcare-in-europe.com: AI in multimodality hybrid imaging: a diamond in the rough. Article. December 2022. Irène Buvat. https://healthcare-in-europe.com/en/news/ai-multimodality-hybrid-imaging.html - Declics: Dialogues Entre Chercheurs et Lycéens pour les Intéresser à la Construction des Savoirs, Orsay and Antony high schools. December 2022. Carole Thomas.
Expertise: commissions of trust (ERC panel, CNRS & Inserm Committees, advisory boards, etc.) -Name -Elected or nominated member -Period of mandate (start & end if known)	- Irène Buvat, member of the Artificial Intelligence Task Force of the Society of Nuclear Medicine and Molecular Imaging, USA (nominated), 2019-now. - Irène Buvat, Christophe Nioche, Fanny Orlhac, members of the International Biomarker Standardization Initiative (IBSI), 2018-now. - Irène Buvat, ITMO Cancer expert (nominated), 2014-2022. - Irène Buvat, IBISA, member of the scientific committee (nominated), 2020-2022. - Irène Buvat, Institut Pascal, Université Paris Saclay, member of the scientific committee (nominated), 2016-now. - Irène Buvat, member of the “Commission Institutionnelle d’Ethique” of Institut Curie, 2021-now. - Irène Buvat, member of CSS7 Inserm, 2022-now. - Fanny Orlhac, member of Artificial Intelligence working group of Unicancer, 2019-now. - Frédérique Frouin, Labex PRIMES, Scientific Advisory Board, member (nominated) 2019-now. - Fanny Orlhac, ANR CE45, member of the scientific committee (nominated), 2022-2023.
Board memberships (e.g.: journal editor, etc.)	- Associate editor of the “Journal of Nuclear Medicine” (IF=11.082): management of ~ 60 manuscripts every year, since 2020. Irène Buvat - Associate editor of “Molecular Imaging and Biology” (IF=3.488): management of ~ 4 manuscripts every year, since 2020. Irène Buvat - Board member of “European Journal of Nuclear Medicine and Molecular Imaging” (IF=10.057): management of ~ 5 manuscripts every year and 1 special issue / year, since 2019. Irène Buvat - Board member of “EJNMMI Research” (IF=3.434): management of ~ 5 manuscripts every year. Irène Buvat - Board member of “Physics in Medicine and Biology” (IF=4.174): management of ~10 manuscripts every year. Frédérique Frouin.
Memberships of Scientific Societies	Member of the Society of Nuclear Medicine and Molecular Imaging, Irène Buvat, Fanny Orlhac

	2. Member of the European Alliance of Medical and Biological Engineering and Science (EAMBES), Irène Buvat 3. Member of the European Association of Nuclear Medicine, Irène Buvat, 4. Member of the European Society of Radiology, Irène Buvat 5. Member of the Société Française de Photobiologie, Carole Thomas 6. Member of the IEEE Engineering in Medicine and Biology Society, Frédérique Frouin 7. Member of the GDR Photomed, Carole Thomas
Other expertise (reviewer for scientific journals, expert for national and international funding bodies, e.g. ANR, ERC, etc)	1. Regular reviewers (>3 papers per year) for scientific journals: Journal of Nuclear Medicine (I Buvat, F Orlhac), Physics in Medicine and Biology (I Buvat, F Frouin), Medical Physics (I Buvat), IEEE Transactions on Medical Imaging (I Buvat), European Journal of Nuclear Medicine and Molecular Imaging (I Buvat, RD Seban), EJNMMI Research (I Buvat), EJNMMI Physics (I Buvat, F Orlhac), Journal of the American College of Cardiology (I Buvat), Eur Radiology (I Buvat, F Frouin, F Orlhac), Cancers (C Thomas, L Champion, RD Seban), Cancer management and research (C Thomas), International Journal of Molecular sciences (C Thomas), International Journal of Radiation Oncology Biology and Physics (C Thomas), Investigative Ophthalmology and visual science (C Thomas), J Material chemistry B (C Thomas), J Porphyrin Phthalocyanines (C Thomas), Marine drugs (C Thomas), Nanoscale (C Thomas), Photochemical and Photobiological Sciences (C Thomas), Sci Pharm (C Thomas), Cancer management and research (C Thomas), PhotoDiagnosis and Photodynamic Therapy (C Thomas), Pharmaceuticals (C Thomas), European Journal of Cancer (RD Seban). 2. Expertise for international funding bodies: • Institut Jules Bordet, Belgium (I Buvat) (grants) • University of California Los Angeles, Yale University, Johns Hopkins School of Medicine (I Buvat) (Tenure tracks and promotions) • Society of Nuclear Medicine and Molecular Imaging (USA): Tracy Lynn Faber Memorial Award (F Orlhac); Hoffmann Award (I Buvat) • Université de Genève (Tenure track) • AIRC: Fondazione AIRC per la ricerca sul cancro (Italy) (grants) • Medical University of Vienna (grants) 3. Expertise for national funding bodies: • ANR (I Buvat) • ANRT CIFRE grants (I Buvat) • Cancéropôle Ile de France (I Buvat) • Centre de Lutte Contre le Cancer (I Buvat) • Cancéropôle Provence Alpes Côte d'Azur (F Orlhac) • INCA (I Buvat) 4. Reviews for international meetings: • Society of Nuclear Medicine and Molecular Imaging annual meeting (I Buvat, F Orlhac) • European Association of Nuclear Medicine annual meeting (I Buvat, F Orlhac) • MICCAI (Medical Image Computing and computer Assisted Intervention) Challenges (F Orlhac) • European Congress of Radiology (I Buvat) • European Society of Molecular Imaging (ESMI) meeting (I Buvat, F Orlhac) 5. PhD thesis committees: • Marie-Judith Saint Martin, "Definition of predictive models to assess the response to neoadjuvant chemotherapy from breast

	magnetic resonance images”, Université Paris Saclay, 2022, F Frouin, PhD supervisor - F Orlhac co-supervisor • Hunor Kertesz, “Advancing Image Reconstruction for Positron Emission Tomography”, Medical University of Vienna, 2022, I Buvat reviewer. • Loïc Duron, “Radiomique et intelligence artificielle appliquées à l’imagerie médicale : validation méthodologique et application aux tumeurs solides”, Université Paris Cité, 2022, I Buvat member of the defense committee. • Constance Fourcade, “Suivi du cancer du sein métastaté via le recalage et la segmentation d’images TEP en utilisant des méthodes conventionnelles et des réseaux convolutifs entraînés et non-entraînés”, Ecole Centrale de Nantes, 2022, I Buvat member of the defense committee. • Anne-Ségolène Cottureau, “Développement et applications cliniques de nouveaux biomarqueurs en imagerie TEP au 18F-FDG dans les lymphomes”, Université Paris Saclay, 2022, I Buvat supervisor.
CLINICAL ACTIVITIES	
Link with Curie Hospital or other -Person -Project -Fundings	1. Curie Hospital: Hervé Brisse / Caroline Malhaire (Medical Imaging department): Neotex, Radiomics in breast MRI to predict response to neoadjuvant chemotherapy, « Temps Médical Protégé ». Participation in the EORTC BCG 1984 trial. 2. Curie Hospital: François Clément Bidard (Medical Oncology) / Olivier Madar (Dpt of radiopharmacology) / Fatima Mechta Grigoriou (Research center): Ga68-FAPI synthesis for clinical imaging of Fibroblast Activation Protein activation, PMS Sein funding and RHU Cassiopeia. 3. Curie Hospital: Laurence Champion / Romain-David Seban (Dpt of Nuclear Medicine, Saint Cloud): Prediction of Axillary lymph node involvement and Metastasis occurrence in BREast cancer PET imaging using Artificial Intelligence, CIFRE grant of Thibault Escobar supported by Dosisoft 4. Curie Hospital: Nicolas Girard (Dpt of Thoracic Oncology), Alain Livartowski (Direction of Data), Nina Jehanno and Marie Luporsi (Dpt of Nuclear Medicine, Paris), Hervé Brisse (Dpt of Radiology, Paris): Radiomic approaches for lung cancer precision medicine, PANACEE project (Janseen Horizon funding), TIPIT project (Fondation Arc funding), Precision Predict project (BPI and Health Data Hub funding), NEMO-PET project (ANR JCJC funding) 5. Curie Hospital: Gilles Créhange, Valentin Calugaru, Arnaud Beddok (Dpt of Oncology – Radiotherapy): Radiomics for the characterization of tissue damages induced by radiation therapy and optimization of re-irradiation treatment plans, supervision of PhD thesis of Arnaud Beddok 6. Curie Hospital: Nathalie Cassoux (Dpt of Onco-ophtalmology), François Doz (Dpt of Onco-pediatrics), PhotoDynamicTherapy project for retinoblastoma treatment, Retinostop (PSL and Fondation l’Occitane fundings) 7. Curie Hospital: Neuroblastomics: Marie Luporsi and Nina Jehanno (Dpt of Nuclear Medicine, Paris), Hervé Brisse (Dpt of Radiology, Paris), Gudrun Schleiermacher (Dpt of Pediatric Oncology): Radiomics for the characterization of neuroblastoma based on MIBG SPECT imaging. 8. Other - Centre Antoine Lassagne - Nice: Jacques Darcourt, Olivier Humbert (Dpt of Nuclear Medicine): Identification of Parkinsonian patients based on 18F-FDOPA PET images and deep learning methods to predict lung

	cancer patient survival for immunotherapy (3IA Côte d'Azur and LITO funding) 9. Other - Dpt of Nuclear Medicine, Cochin Hospital, Paris: Anne-Ségolène Cottureau, Design and validation of PET imaging prognostic biomarkers for lymphoma patients. Siemens funding as part of a CIFRE contract with Louis Rebaud. 10. Other - Dpt of Radiology, Avicenne Hospital, Bobigny: Pierre-Yves Brillet, IRMomics in lung cancer patients (LITO funding).
DISTINCTIONS	
List of Awards for PI -Title -Date -Country	1. 1st prize in the HECKTOR challenge presented at the MICCAI international conference concerning the creation of a model for predicting the recurrence-free survival of Head and Neck cancer patients based on their PET/CT images and clinical information. Rebaud Louis, Escobar Thibault, Khalid Fahad, Girum Kibrom, Buvat Irène. September 2022. Singapore. https://hecktor.grand-challenge.org/Prize/ 2. Best paper award for the paper: "Simplicity is all you need: out-of-the-box NNUnet followed by Binary-Weighted-Radiomic model for segmentation and outcome prediction in Head and Neck PET/CT" related to the HECKTOR challenge presented at the MICCAI international conference concerning the creation of a model for predicting the recurrence-free survival of Head and Neck cancer patients based on their PET/CT images and clinical information. Rebaud Louis, Escobar Thibault, Khalid Fahad, Girum Kibrom, Buvat Irène. October 2022. Singapore. https://hecktor.grand-challenge.org/Prize/
List of Awards for Team Members -Title -Date -Country	1. 1st prize in the HECKTOR challenge presented at the MICCAI international conference concerning the creation of a model for predicting the recurrence-free survival of Head and Neck cancer patients based on their PET/CT images and clinical information. Rebaud Louis, Escobar Thibault, Khalid Fahad, Girum Kibrom, Buvat Irène. September 2022. Singapore. https://hecktor.grand-challenge.org/Prize/ 2. Best paper award for the paper: "Simplicity is all you need: out-of-the-box NNUnet followed by Binary-Weighted-Radiomic model for segmentation and outcome prediction in Head and Neck PET/CT" related to the HECKTOR challenge presented at the MICCAI international conference concerning the creation of a model for predicting the recurrence-free survival of Head and Neck cancer patients based on their PET/CT images and clinical information. Rebaud Louis, Escobar Thibault, Khalid Fahad, Girum Kibrom, Buvat Irène. October 2022. Singapore. https://hecktor.grand-challenge.org/Prize/ 3. 1st place of the Physics, Instrumentation & Data Science Council Young Investigator award to Thibault Escobar, for his oral presentation entitled "Radiomic decision maps reveal patterns discriminating between glioma progression and radiation-induced necrosis in static and dual time [18F]-FDOPA PET" presented at the SNMMI annual meeting in June 2022 at Vancouver (Canada).

List of Promotions (CR1, DR1, etc.) for PI & Team members Only for CNRS, Inserm, Universities members - Name -Date -Grade	Frédérique Frouin: CRCN Inserm → CRHC Inserm, effective 1st January 2022.
List of Recruitments (new permanent CNRS, Inserm, Univ.) for Team members Only for CNRS, Inserm, Universities members -Name -Date -If Inserm, CNRS, Universities	n/a
List of Researchers HDR for PI & Team members	1. Hervé Brisse, PH Curie 2. Irène Buvat, DR1 CNRS 3. Frédérique Frouin, CRHC Inserm 4. Michaël Soussan, PUPH Paris 13 5. Carole Thomas, CRCN Inserm
ON-GOING FUNDED PROJECTS & COLLABORATIONS	
NATIONAL - Individual projects Project Title Translational or not Funding source Managed by Curie, CNRS... Total Amount - k€ Period (start-end) Publications or Patents <i>Indicate the number in your list</i>	PANACEE , translational , PI: Fanny Orlhac, funded by Janssen Horizon, managed by Curie, 150 k€, 2020-2023. Publications: not yet NEMO-PET , translational , PI: Fanny Orlhac, funded by ANR JCJC, managed by Curie, 226 k€, 2022-2026. Publications: not yet
INTERNATIONAL - Individual projects Project Title Translational or not Funding source Managed by Curie, CNRS... Total Amount - k€ Period (start-end) Publications or Patents <i>Indicate the number in your list</i>	
INDUSTRIAL - Individual projects Project Title Translational or not Funding source Managed by Curie, CNRS...	1. CIFRE grant of Thibault Escobar funded by Dosisoft : Development of radiomic models for treatment planning and patient monitoring in PET/CT/MRI. Contract managed by Curie, 60 k€ for Curie + 118 k€ for the PhD salary directly supported by Dosisoft, 2020-2023. Publication: Numbers 4, 26. 2. CIFRE grant of Louis Rebaud funded by Siemens Healthineers : Whole-

Total Amount - k€ Period (start-end) Publications or Patents <i>Indicate the number in your list</i>	body and total-body biomarkers in PET/CT imaging. Contract managed by Curie, 73 k€ for Curie + 118 k€ for the PhD salary directly supported by Siemens, 2021-2024. Publication: Number 4. 3. CIFRE grant of Maria Grazia Ronga funded by Thales: Study of very high energy electron radiation therapy (VHEE). Contract managed by Curie, 79 k€ for Curie + 118 k€ for the PhD salary directly supported by Thales, 2021-2024. Publications: Number 39
NATIONAL - Collaborative projects Project Title Translational or not PI role: PI Role: <i>Coord. or Part.</i> Funding source Managed by Curie, CNRS... Total Amount - k€ Period (start-end) Publications or Patents <i>Indicate the number in your list</i>	PHRC-I FAP-IT, PI: Romain-David Seban, funded by DGOS, managed by Curie Hospital, 429 k€ for Curie, 2023-2026. No publication yet. PRT-K DEFI-LOC, PI: Carole Soussain, funded by DGOS and INCA, managed by Curie Hospital, 389 k€ for Curie, 2023-2026. No publication yet. PRT-K Federated-PET, PI: Olivier Humbert, funded by DGOS and INCA, managed by CAL and Inria, 63k€ for LITO, 2023-2026. No publication yet. Precision-Predict, translational, PI: Nicolas Girard, Co-PI in LITO: Irène Buvat and Fanny Orhac (partners), funded by BPI France and Health Data Hub, managed by Curie, 300 k€ for Curie, 2020-2023. No publication yet. TIPIT, translational, PI: Emmanuel Barillot, PI in LITO: Irène Buvat and Fanny Orhac (partners), funded by Fondation Arc, managed by Curie, 600 k€ (~180 k€ for LITO), 2020-2023. No publication yet. AgeMed 2.0, translational, From aged cells to medical applications, PI: Eric Gilson, PI Curie: Irène Buvat (partner), managed by Inserm, 61.5 k€, 2020-2024. No publication yet. BIOMEDE-IA, translational, Artificial Intelligence tools for DIPG characterization PI: Frédérique Frouin, funded by Gustave-Roussy, managed by Inserm, 120 k€, 2020-2023. Publications: No publication in 2022 VOCALE: Detection of recurrent nerve palsy using echography, PHRC-I PI C Trésallet, coPI Frédérique Frouin, managed by Inserm, 110 k€, 2019-2023. No publication yet. EXOGLYC: Cardiac vectoring of extracellular vesicles by modification of their glycosylation, PI: Philippe Menasché, PI Curie: Claire Provost, ANR funding managed by Curie (24 k€ for LITO), 2021-2023. No publication yet. Retinoblastoma, translational Inter- and intratumoral heterogeneity of retinoblastomas, funded by Projet Ligue contre le cancer, PI F Radvanyi, coPI Irène Buvat, Hervé Brisse, managed by Curie, 25 k€, 2021-2024. No publication yet.
INTERNATIONAL - Collaborative projects Project Title Translational or not PI role: PI Role: <i>Coord. or Part.</i> Funding source Managed by Curie, CNRS... Total Amount - k€ Period (start-end) Publications or Patents <i>Indicate the number in your list</i>	HOLY2020, translational, PI in France: Irène Buvat (partner), funded by EraCoSysMed3rd joined transnational call (ANR-19-SYME-0005-03 contract), managed by Curie, 237 k€ for LITO, 2020-2023. Publications: Numbers 4 and 19. Inter-Organ PET, PI: Irène Buvat (LITO) and Thomas Beyer (Medical University of Vienna), funded by ANR PRCI, managed by Curie, 293 k€ for LITO, 2023-2026. Publications: not yet
INDUSTRIAL - Collaborative projects Project Title Translational or not PI role: PI Role: <i>Coord. or Part.</i>	AI.DReAM, translational, PI: Baptiste Perrin GE Healthcare, PI Curie: Irène Buvat (partner), funded by BPI France, managed by Curie, 710 k€, 2020-2025. Publications: not yet. PDT to treat retinoblastoma, translational, PI Curie: Carole Thomas collaboration with the Laboratoires Synth-Innove, funded by PSL pré-

Funding source Managed by Curie, CNRS... Total Amount - k€ Period (start-end) Publications or Patents <i>Indicate the number in your list</i>	maturation 70K€ (2018-2022), Fondation l'Occitane 20k€ (2019-2021). Publications: not yet. 3. RHU CASSIOPEIA , translational , PI: Fatima Mechta-Grigoriou Institut Curie, funded by ANR, managed by Curie, 9966 k€, 2022-2027. Publication: Number 21. 4. VOCALISE , translational , PI: Frédérique Frouin, funded by ANR, managed by Curie, 160 k€, 2022-2026. Publications: not yet.
Collaborations with the USA - <i>Researcher's name</i> - <i>Researcher's Institute</i> <i>If she/he has publications, write the DOI</i>	1. Tyler Bradshaw, University of Wisconsin School of Medicine and Public Health and SNMMI AI Task Force DOI: 10.2967/jnumed.121.262567 DOI: 10.2967/jnumed.121.263703 DOI: 10.2967/jnumed.121.263239
Other International collaborations	1. International group of lymphoma experts. Heiko Schöder - MSKCC New York, Sally Barrington - King's College London, Ronald Boellaard -VUMC Amsterdam, Luca Ceriani - Lugano, Luca Guerra – Milano, etc
Other French collaborations	1. LYSA – Lymphoma Study Association, France.
Other Highlight for the year	
Comments	