



Name Denis LE BIHAN, MD, PhD
Institution NeuroSpin
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Status 300 publications, 15 patents, H-score 110
(60 000 citations “Le Bihan D” & “LeBihan D”, 20 000 for the first 5)

CURRENT POSITION: CEA Research Director & NeuroSpin Founding-Director / Visiting Professor Kyoto University and National Institutes for Physiological Sciences (Okazaki).

EDUCATION/ EMPLOYMENT HISTORY:

[EDUCATION]: 1984: Medicine (MD, University of Paris) with Board Certification in Radiology; 1987: Physics (PhD, Nuclear/Particles Physics, University of Paris-Orsay); 1977-79: Human Biology (MS, University of Paris Pierre & Marie Curie with majors in Neurophysiology, Biomathematics, Data Processing and Statistics and Computer Sciences).

[EMPLOYMENT]: NeuroSpin, CEA-Saclay, France (since 2007); Kyoto University, Kyoto, Japan (Visiting Professor, Graduate School of Medicine, Human Brain Research Center, since 2005); NIPS/Okazaki (since 2017); Federative Research Institute on Functional Neuroimaging (IFR49) (Director, 2000-2013); Service Hospitalier Frédéric Joliot, CEA, Orsay, France (1994-2006, Director, Laboratory of Anatomical and Functional Neuroimaging); Georgetown University Hospital, Washington, DC, USA (Clinical Assistant then Associate Professor of Radiology, Department of Radiology, 1989-96); National Institutes of Health, Bethesda, MD, USA (1987-1994: Visiting Associate, Diagnostic Radiology Department, Clinical Center, then Chief, Diagnostic Radiology Research Section with Tenure).

SUMMARY OF RESEARCH:

1984-88: Introduce and implement molecular diffusion imaging with MRI as we know it today (concepts, methodology and first applications in the human brain), extension of the diffusion imaging concept framework to pseudo diffusion to take into account effects of blood microcirculation (IVIM); 1988-1990: Fast Diffusion Imaging (SSFP, EPI sequences); 1991: Temperature imaging from diffusion MRI; 1991: First color encoded images of the orientation of white matter tracks in the human brain using diffusion MRI; 1992-94: Introduce and implement Diffusion Tensor Imaging (DTI) (with P. Basser and J. Mattiello); 1993: First diffusion MRS in the human brain; 1995: First textbook on diffusion and perfusion MRI, including fMRI; 1998-2000: brain tractography using DTI (with C. Poupon and JF Mangin). 2001, 2006: Diffusion fMRI (new approach for functional neuroimaging more directly linked to neuronal activation than standard BOLD fMRI). **Current research: Brain:** Mechanisms of neuronal network activation (neuronal swelling) and water diffusion models (water status); brain global network models; glymphatic system; ultra-high field MRI. **Body:** New IVIM/non-Gaussian diffusion signature biomarkers (oncology: breast & prostate cancer; radiation oncology: brain); diffusion-based virtual MR Elastography (oncology, liver diseases).

ACCOLADES / POSITIONS:

Officer of the French Order of Merit; Member of the Institut of France, Academy of Sciences, Academy of Technologies, Academy of Pharmacy, Academy of Medicine; **2021:** Eduard Rhein Foundation Award; **2020:** Elected on the Board of Trustees, International Society of Magnetic Resonance in Medicine; **2020:** Honorary Membership, Japan Radiological Society; **2018:** Honour Certificate, Japan Minister of Foreign Affairs; **2016:** Hyde Lecture (Resting State Brain Connectivity, Vienna) **2014:** Louis-Jeantet Prize; Lauterbur Lecture (ISMRM, Milan); **2012:** Honda Prize **2010:** Holst Award; **2010:** JA Vezina Award, Honorary Member of French Canadian Society of Radiological; **2009:** Bécélère Honorary Lecturer, Medal of the 100th Anniversary of the French Society of Radiology; **2009:** Fellow of the European Society for

Magnetic Resonance in Medicine and Biology; **2004**: Honorary Member, American Society of NeuroRadiology; **2003**: Louis D. Foundation Award; **2002**: Lounsbery Award from the National Academy of Sciences (US) and the French Academy of Sciences; **2002**: ECR 04 Honorary Lecturer; **2001**: Gold Medal, International Society of Magnetic Resonance in Medicine. **1989, 1993, 2002**: Organize the first (I)SMRM workshops on diffusion/perfusion MRI.

PUBLICATIONS

(Google scholar: 60 000 citations, H-score 110)

Patents

- Process for Imaging by Nuclear Magnetic Resonance (US Patent # 4,780,674).
- Process for Imaging by Nuclear Magnetic Resonance (US Patent # RE33,391).
- Method to Measure the Molecular Diffusion and/or Perfusion Parameters of Live Tissue (US Patent # 4,809,701).
- In Vivo Method for Determining and Imaging Temperature of an Object/Subject from Diffusion Coefficients Obtained by Nuclear Magnetic Resonance (US Patent # 4,914,608).
- Method for the imaging of intra-voxel movements by NMR in a body (US Patent # 5,092,335).
- Apparatus for Hyperthermia Treatment of Cancer (US Patent # 5,284,144).
- Method for Diffusion Tensor NMR Imaging (US Patent # 5,539,310).
- Method and system for multidimensional localization and for rapid magnetic resonance spectroscopic imaging (US Patent # 5,657,758).
- Method and system for multidimensional localization and for rapid magnetic resonance spectroscopic imaging (US Patent # 5,709,208).
- Method and system for multidimensional localization and for rapid magnetic resonance spectroscopic imaging (US Patent # 5,879,299).
- Le Bihan D. WO/2015189769 A1: MRI method to quantify iron amount in tissues using diffusion magnetic resonance imaging.
- Le Bihan D, lima M, Kanao Y. WO/2015133363: Image processing unit, magnetic resonance imaging device, image processing method, and recording medium (2 industrial licensees).
- Le Bihan D. WO/2016166115 A1: MRI method for determining signature indices of an observed tissue from signal patterns obtained by motion-probing pulsed gradient MRI (1 industrial licensee) (under review)

Books

- Imagerie par Résonance Magnétique : Bases Physiques. Masson, Paris, 1984. (*first textbook on MRI physics in French*)
- Magnetic Resonance Imaging of Diffusion and Perfusion: Applications to Functional Imaging. Lippincott-Raven Press, New York, 1995 (*first textbook published on diffusion MRI and fMRI*).
- Water, the forgotten biological molecule (D. Le Bihan, H. Fukuyama coeds), Pan Stanford Publishing, Singapore, 2011
- Le cerveau de cristal, ce que la neuroimagerie nous révèle. Editions Odile Jacob, Paris, 2012
- Looking into the brain: The power of neuroimaging. Princeton University Press, 2014.
- IVIM MRI: Principles and Applications (Le Bihan D., lima M., Federau C., Sigmund E.E, Coeds), Pan Stanford Publishing, Singapore, 2019.
- Breast Diffusion MRI (Le Bihan D, lima M., Partridge SC, Coeds), Elsevier, (in preparation)

5 most cited articles

- **Le Bihan D.**, Breton E., Lallemand D., Grenier P., Cabanis E., Laval-Jeantet M. MR Imaging of Intravoxel Incoherent Motions: Application to Diffusion and Perfusion in Neurologic Disorders, *Radiology*, 161,401-407, 1986. (**3800** citations, 5th most cited article of all times in the field of radiology, just after the article of Hounsfield on the CT scanner invention).
- **Le Bihan D.**, Breton E, Lallemand D, Aubin ML, Vignaud J, Laval-Jeantet M. Separation of diffusion and perfusion in intravoxel incoherent motion MR imaging. *Radiology*. 1988 Aug;168(2):497-505. (**2800** citations, 18th most cited article of all times in the field of radiology).
- Basser PJ, Mattiello J, **Le Bihan D.**, MR Diffusion Tensor Spectroscopy and Imaging. *Biophys. J.* 66:259-267, 1994. (**5400** citations)
- Basser PJ, Mattiello J, **Le Bihan D.**, Estimation of the effective self-diffusion tensor from the NMR spin echo. *J Magn Reson B.* 1994 Mar;103(3):247-54. (**3700** citations)

- **Le Bihan D.**, Mangin JF, Poupon C, Clark CA, Pappata S, Molko N, Chabriet H. Diffusion tensor imaging: concepts and applications. *J Magn Reson Imaging*. 2001 Apr;13(4):534-46. Review. (**3500** citations, most downloaded among all *JMRI* articles).