

### Carreer

1972 : Pharmacist, Université Catholique de Louvain (UCL), Belgium  
1975 : PhD in Pharmaceutical Sciences, UCL  
1976-1977: Post-doctoral research position, ETH Zürich (Switzerland)  
1978-1983: Associate Professor, UCL  
1980 : Agrégation of « Enseignement Supérieur », UCL  
Since 1984 : Full Professor of Pharmacy, Université Paris-Sud (France)  
2009-2010: Professor at the prestigious « Collège de France », holder of the chair of “Innovation Technologique Liliane Bettencourt”  
Since 2010: Senior Member of the “Institut Universitaire de France” (IUF)

### Positions

- 1998-2010: Director of the Department “Physico-Chemistry, Pharmaceutical Technology and Biopharmacy” (UMR CNRS 8612), a Multidisciplinary Research Institute specialized in drug delivery and targeting (110 researchers).  
- 1999-2006: Director of the Doctoral School “Therapeutic Innovation”(300 PhD students)  
- 2005-2010: Responsible for the “Drug Discovery” within the pole of competitiveness “MEDICEN”

### Research and main research achievements

*The research performed is aiming to discover and design new nanomedicines for the treatment of severe diseases in oncology, neurosciences and intracellular resistant infections. This research has let to:*

- 578 international publications, some of them in prestigious journals (2 Nature Nanotechnology, 2 Nature Materials, 2 Nature Communications, 1 Nature Reviews Bioengineering, 2 Science Advances, 1 PNAS, 3 Angewandte Chemie, 7 ACS Nano, 1 Cancer Research etc.),  
- 121 review articles and book chapters,  
- 94 patents,  
- 385 plenary and invited lectures at international and national congress,  
- the authorship of 8 books,  
- as well as 98 PhD thesis

Patrick COUVREUR (Google Scholar H-index 131; citations 78,000 and Web of Science H-index 105; citations 53,000) is one of the Highly Cited Researchers (Web of Science).

### **Main research achievements:**

- Discovery in 1977 that nanotechnologies may be used for the **intracellular** delivery of drugs (Febs Letters 1977)  
- Discovery in 1978 of polyalkylcyanoacrylate nanoparticles, **the first biodegradable nanoparticles** for human use (J. Pharm. Pharmacol. 1979 and US and European patent 1978)  
- First discovery that insulin may be administered **orally** using nanocapsules (Diabetes 1988)  
- Discovery that doxorubicin loaded onto polyalkylcyanoacrylate nanoparticles may **overcome the multidrug resistance** and first clinical trials (British Journal of Cancer 1997, J. Hepatol 2005)  
- New **functional polymers for drug delivery** (Macromol.1997, JCR 2006, Macromol. 2008 a and b and ACS Nano 2012a)  
- Use of nanoparticles for the delivery of **antisens oligonucleotides and siRNA** (BBRC 1992, Pharm Res 1992; BBA 1996; BBRC 2001; JCR 2005, Nucl. Ac. Res. 2008 and J Med Chem 2011)  
- Use of PEG coated polyalkylcyanoacrylate nanoparticles for **ocular and brain delivery** (IOVS 2002, Europ. J Neurosci. 2002; JPET 2002; Europ. J Immunol. 2004; CMLS 2005; Bioconj. Chem. 2005 a, J. Neurochem. 2005; CMLS 2007; J. Neurosci., 2009, ACS Nano 2012a and ACS Nano 2012b)  
- **Cubosomes** (J Phys. Chem. B Letters 2005; JACS, 2006; JACS 2007 a and Accounts in Chem Res, 2011)

- **Ultra small particles of iron oxide** for tumour imaging and hyperthermia (Bioconj. Chem. 2005 b, JACS 2007 b, J Chem Mater, 2012 and Chem Rev 2012a) and **iron-based metal–organic nanocarriers** for drug delivery (Nature Materials, 2010; Angewandte Chemie 2010, Chem Rev 2012b, Angewandte Chemie 2017)
- **Stimuli-responsive nanodevices** (ACS Nano 2011, ACS Nano 2012, Nature Materials 2013 and Nature Communications 2022)
- The “**squalenoylation**” a new platform for the discovery of new nanomedicines (US and European Patent, 2015; NanoLetters 2006; JCR 2007; Small 2008; JPET 2008; DMD 2008; Langmuir 2008; Adv Funct Mater 2008; Molec. Pharm., 2009; JCR 2010; ACS Nano 2011, ACS Nano 2012c, Biomaterials 2013, Angewandte Chemie 2013, ACS Nano 2014, PNAS 2014, Nature Nanotechnology 2014, Molecular Therapy 2017, Cancer Research 2017, Nature Communications 2017, Science Advances 2019, Science Advances 2020)

### **Funding ID**

Since 2005, my group and myself have received more than 25 grants for a total amount of around 20 million €, all related to the conception and/or development of Nanomedicines. Grants were obtained either from the French National Agency of Research (ANR), from other French Governmental Agencies (OSEO ANVAR), from private companies (SERVIER, LFB, SANOFI-AVENTIS and SANOFI), from the pole of competitiveness MEDICEN and from the European Community (H2020 grants) and EURONANOMED. I was also awarded by an “ERC Advanced Grant” for 2,200,000 € and an ERC PoC grant for 150,000 €.

### **Commercialization**

P. Couvreur has been co-founder and President of the scientific board of BIOALLIANCE (currently ONXEO) which has been created to translate into clinic, the technology of doxorubicin-loaded polyalkylcyanoacrylate nanoparticles. This company with over 60 employees entered the stock market on 7<sup>th</sup> December 2005 and the doxorubicin loaded polyalkylcyanoacrylate nanoparticles (Livatag<sup>®</sup>) has reached a terminated phase III clinical trial. P. Couvreur is also the Founder of the start-up company MEDSQUAL in France and SQUAL Pharma in the US to lead to the clinic, the *squalenoyl* nanomedicines.

### **Principal International Responsibilities (past and present)**

- Member of the Board of Governors of the Controlled Release Society (1989-1993)
- President of the «Award Committee» of the «Board of Pharmaceutical Sciences» of FIP (International Pharmaceutical Federation) (1994-2000)
- Chair of the 27th International Symposium on Controlled Release of Bioactive Materials, Paris, 9-13 July 2000 (1500 participants)
- Member of the Board of the International Society of Drug Delivery Sciences and Technology (APGI) (1992-2002)
- Member of the «Board of Pharmaceutical Sciences» (BPS) of FIP (International Pharmaceutical Federation) (1994-2002)
- Member of the Executive Committee of the International Consortium ULLA (Universities of Uppsala, Leyden, Amsterdam, London, Copenhagen and Paris Sud) (1998-2002)
- Member of the Academic Scientific Committee for the evaluation of the Dutch universities (VCNU) (2002)
- Chair of several International Congresses and Symposium on Controlled Release
- President of the Committee for Academic Research and Relations (CARR) of the European Federation of Pharmaceutical Sciences (EUFEPS) (2003-2005)
- Field Editor of “Pharmaceutical Research” (2004-2009) and Editor for Europe of the “Journal of Nanoparticle Research” (2000-2008)
- Member of the Editorial Board of numerous other international journals
- Extraordinary Professor at the Université Catholique de Louvain (Belgium) (1985-2016)
- Member of the Senate of EUFEPS (2009-2014)
- Member of the panel LS-7 (Life Sciences, Consolidator Grants) of the European Research Council (ERC) (2014)
- Member of the scientific committee of several European Research Consortia (ITN TRANS-INT; ITN ARGENT)
- Membre of the review committee for many foreign universities (Univ Utrecht, Univ Groningen, Univ Antwerpen, ETH Zürich)
- Member of the Research Council of the « Institut de Ciencia de Materials de Barcelona » (Espagne) (2016- )

- Chair of the panel LS-7 (Life Sciences, Consolidator Grants) of the European Research Council (ERC) (2016, 2018 and 2020)

### **Principal National Responsibilities (past and present)**

- Expert for the French Ministry of Industry, the Ministry of Education and Research, the National Agency for Innovation (OSEO ANVAR), the French “Agence Nationale de la Recherche” (ANR) and the French “Agence d’Evaluation de la Recherche et de l’Enseignement Supérieur” (AERES)
- Member of the National Council of the Universities (CNU) (1987 – 1995)
- Member of the Bureau of the National Committee for Sciences (CNRS) (2000-2002)
- Member of the Scientific Council of the “Centre d’Etudes Pharmaceutiques” (Chatenay-Malabry, Université Paris-Sud) (1985-)
- Member of the Scientific Committee of the “Region Centre” (2005-2011)
- Member of the Scientific Council of “Ecole Normale Supérieure de Cachan” (2007-2011)
- Member of the Council of the “Observatoire des Micro et Nanotechnologies” (OMNT) (2008-2012)
- Founder President of the “Research Group on Drug Delivery and Targeting” (GTRV)
- Scientific Adviser and member of the Scientific Committee of the French National Institute “Technologies pour la Santé” (ITS) (2009-2015)
- One of the founder members of MEDICEN, one of the ten French “Pôles de compétitivité mondiaux” in France
- Member of the Scientific Council of FLAMEL Technologies (Lyon) (2012-2016)
- Member of the Board of Directors of the Senate of the University Paris-Saclay (2013-2016)
- Member of the Executive Board of the NanoSaclay labEX (2012- )
- Member of INNABIOSANTE scientific committee (Toulouse, France) (2013- )
- Member of the executive committee of the Paris-Sud Foundation (2013-2019 )
- Member of the “Collège Scientifique” of the Institut Pasteur (Paris, France) (2013-2017)
- Member of the Scientific Council of the “Département Sciences de la Vie” of the Paris-Saclay University (2016-2019 )
- Member of the Academic Council of the Paris-Saclay University (2013-2019)
- Member of the Executive Committee of the Ecole Pratique des Hautes Etudes (2018-2021)
- President of the National Academy of Pharmacy (2020)
- Member of the International Scientific Committee for the “Grand Projets de Recherche” of Bordeaux University (2021)
- Elected at the “Comité Restraint” (ie., Council) of the French “Académie des Sciences” (2021- )
- Member of the “Conseil d’Administration” of the Paris-Saclay University Foundation (2019- )

### **Academies**

- Member of the “Académie des Sciences” (France)
- Member of the “Académie des Technologies” (France)
- Member and President 2020 of the “Académie de Pharmacie” (France)
- Member of the “Académie de Médecine” (France)
- Foreign Member of the National Academy of Medicine (USA)
- Foreign Member of the National Academy of Engineering (USA)
- Foreign Member of the Royal Academy of Medicine of Belgium (Belgium)
- Foreign Member of the Spanish Academy of Pharmacy (Spain)
- International fellow of the Japanese Academy of Pharmaceutical Sciences and Technology (Japan)
- Member of European Academy of Science (EURASC)
- Member of the Academia Europaea

### **Scientific Awards**

- Winner of the « Concours Universitaire Belge » (1977)
- Winner of the « Prix des Assurances Générales de France » (1981)
- «Alvarenga Prize » of the «Académie Royale de Médecine de Belgique » (1983)
- Awardee of the « Association des Enseignements de Pharmacie Galénique de Langue Française » for the best thesis.

- Winner of the «Prix Quinquennal (1984-1989) des Sciences Pharmaceutiques et Thérapeutiques » of the « Académie Royale de Médecine de Belgique »
- Forcheimer Fund of Israël (1990).
- 1990 winner of the «Young Investigator Award for Excellence in Research» of the «Controlled Release Society» (Reno, USA)
- Vinci of Excellence of the Award «Science pour l'Art» of LVMH (Paris, 1993).
- «Pharmaceutical Scientist of the Year 1996» award of the Fédération Internationale Pharmaceutique (FIP) (Jérusalem, 1996).
- 1998 Glaxo Wellcome International Achievement Award.
- « Prix de l'Innovation et du Transfert de Technologie » given by «Paris Ile-de-de France-Capitale Economique» for the creation of the «start-up» BIOALLIANCE (1999)
- « Barré 2003 Award » of the University of Montréal (Canada)
- Winner of the “2004 Pharmaceutical Sciences World Congress Award” (Kyoto, Japon)
- Awardee of the «8ème concours national d'aide à la création d'entreprises de technologies innovantes » (Emergence) (Paris, 2006)
- “Host Madsen Medal”, the most prestigious award in pharmaceutical sciences, given by the International Federation of Pharmacy in Beijing (China), September 2007
- « Grand Prix de l'Innovation » de « L'USINE NOUVELLE »
- Winner of the “Marie-Maurice Janot Award lecture” given at the 6th World Congress of Pharmaceutics and Biopharmaceutics in Barcelona (Spain), April 2008
- Awardee of the «11ème concours national d'aide à la création d'entreprises de technologies innovantes » (Création) (Paris, 2009)
- Prix Galien (Paris, 2009)
- European Pharmaceutical Scientist Award 2011
- Médaille de l'Innovation du CNRS 2012
- European Inventor Award 2013 (Office Européen des Brevets)
- Speiser Award for Excellence in Pharmaceutical Sciences 2014 (ETH Zürich)
- Principal Investigator of an ERC Advanced Grant (TERNANOMED)
- Principal Investigator of an ERC Proof of Concept Grant (SQUALAC)
- The T. & A. Higuchi Memorial Lectureship Award 2016 (Academy of Japan)
- Prix Internazionale Bronzes de Riace, 16th edition 2017 (Italy)
- Doctor Honoris Causa of the University of Ghent 2018 (Belgium)
- Journal of Drug Targeting's Lifetime Achievement Award 2019
- Chevalier de la Légion d'Honneur (2017)
- Grand Prix Joseph-Achille Le Bel 2019
- Doctor Honoris Causa of University of Montréal (Canada) ceremony in 2020
- Presidential Award of the European Federation of Pharmaceutical Sciences (EUFEPS), 2023
- Officier de l'Ordre National du Mérite (2023)
- Blaise Pascal Medal 2023 of the European Academy of Sciences (EURASC)
- Acta Biomaterialia Gold Medal 2024, a major scientific award in Biomaterials

Some **representative publications since 2010** are as follows:

1. Horcajada P, Chalati T, Serre C, Gillet B, Sebie C, Baati T, Eubank JF, Heurtaux D, Clayette P, Kreuz C, Chang J-S, Hwang Y, Marsaud V, Bories P, Cynober L, Gil S, Férey G, [Couvreur P](#), Gref R. “Porous metal-organic-framework nanoscale carriers as a potential platform for drug delivery and imaging”, **Nature Materials**, 9, 172-178 (2010)
2. Le Droumaguet B, Nicolas J, Brambilla D, Mura S, Maksimenko A, Salvati E, De Kimpe L, Zona C, Airoidi C, Canovi M, Gobbi M, Noiray M, La Ferla B, Nicotra F, Scheper W, Flores O, Masserini M, Andrieux K, [Couvreur P](#), « Versatile and Efficient Targeting Using a Single Nanoparticulate Platform: Application to Cancer and Alzheimer's Disease », **ACS Nano**, 6, 5866-5879 (2012)

3. Harivardhan Reddy L., Arias, JL., Nicolas J, Couvreur P. « *Magnetic nanoparticles: Design and characterization, toxicity and biocompatibility, pharmaceutical and biomedical applications* », **Chem. Rev.**, 112, 5818-5878 (2012)
4. Semiramoth N, Di Meo C; Zouhiri F, Saïd-Hassane F, Valetti S, Gorges R, Nicolas V, Poupaert J, Chollet-Martin S, Desmaele D, Gref R, Couvreur P. “*Self-Assembled Squalenoylated Penicillin Bioconjugates: An Original Approach for the Treatment of Intracellular Infections*”, **ACS Nano**, 6, 3820-3831 (2012)
5. Harrisson S, Nicolas J, Maksimenko A, Trung Bui D, Mougín J, Couvreur P. “*Nanoparticles with In Vivo Anticancer Activity from Polymer Prodrug Amphiphiles Prepared by Living Radical Polymerization* », **Angewandte Chemie Int. Edition**, 52, 1678-82 (2013)
6. S. Mura, J. Nicolas, P. Couvreur, “*Stimuli-responsive nanocarriers for drug delivery*”, **Nature Materials**, 12, 991-1003 (2013)
7. Maksimenko A, Dosio F, Mougín J, Ferrero A, Wack S, Harivardhan Reddy L, Weyn A A, Lepeltier E, Bourgaux C, Stella B, Cattel L, Couvreur P. « *Squalenoylated Doxorubicin: a New Long Circulating and Non Pegylated Anticancer Nanomedicine* », **Proceed. Natl. Acad. Sci. USA**, E217–E226 (2014)
8. Gaudin A, Yemisci M, Eroglu H, Lepêtre-Mouelhi S, Turkoglu OF, Dönmez-Demir B, Caban S, Sargon MF, Garcia-Argote S, Pieters G, Loreau O, Rousseau B, Tagit O, Hildebrandt N, Le Dantec Y, Mougín J, Valetti S, Chacun H, Nicolas V, Desmaële D, Andrieux K, Capan Y, Dalkara T, Couvreur P. “*Squalenoyl Adenosine Nanoparticles provide Neuroprotection after Stroke and Spinal Cord Injury*”, **Nature Nanotechnology**, 9, 1054-1063 (2014)
9. Kotelevets L, Chastre E, Caron J, Mougín J, Bastian G, Pineau A, Walker F, Lehy T, Desmaële D, Couvreur P. « *A SqualeneBased Nanomedicine for Oral Treatment of Colon Cancer* », **Cancer Research**, 77, 2964-2975 (2017)
10. Simon-Yarza T, Gimenez-Marques M, Mrimi R, Mielcarek A, Gref R, Horcajada P, Serre C, Couvreur P. « *Smart metal-organic-framework nanomaterial for lung targeting* », **Angewandte Chemie International Edition**, 56, 15565-15569 (2017)
11. Sobot D, Mura S, Yesylevskyy SO, Dalbin L, Cayre F, Bort G, Mougín J, Desmaële D, LepetreMouelhi S, Pieters G, Andreiuk B, Klymchenko AS, Paul JL, Ramseyer C, Couvreur P. « *Conjugation of squalene to gemcitabine as unique approach exploiting endogenous lipoproteins for drug delivery* », **Nature Communications**, 8, 15678. doi: 10.1038/ncomms15678 (2017)
12. Feng J, Lepetre-Mouelhi S, Gautier A, Mura S, Cailleau C, Coudore F, Hamon M, Couvreur P. “*A new painkiller nanomedicine to bypass the blood-brain barrier and the use of morphine*”, **Science Advances**, 5: eaau5148 (2019)
13. Dormont F, Brusini R, Cailleau C, Reynaud F, Peramo A, Gendron A, Mougín J, Gaudin F, Varna M, Couvreur P. « *Squalene-based multidrug nanoparticles for improved mitigation of uncontrolled inflammation* », **Science Advances**, 6, 23, eaaz5466 (2020)
14. Guesdon-Vennerie A, Couvreur P. Ali F, Pouzoulet F, Roulin C, Martínez-Rovira I, Bernadat G, Legrand FX, Bourgaux C, Mazars C M, Marco S, Trépout S, Mura S, Mériaux S, Bort G “*Breaking photoswitch activation depth limit using ionising radiation stimuli adapted to clinical application*”, **Nature Communications**, 13:4102 (2022)
15. Couvreur P. Sinda Lepetre-Mouelhi, Elisa Garbayo, Maria J. Blanco-Prieto, *Self-assembled lipid-prodrug nanoparticles*, **Nature Reviews Bioengineering**, <https://doi.org/10.1038/s44222-023-00082-0> (2023)

