

Francesca Buttini

Curriculum Vitae of scientific and teaching activity

Personal Details

Date of birth: April 18th, 1979

Citizenship: Italian

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Current positions

- **Associate Professor**, Food and Drug Department, University of Parma (Italy), (SSDcode CHIM / 09 Pharmaceutical Technology) – January 2018 to current;
- **Visiting Professor**, Institute of Pharmaceutical Science, King's College London, London, (UK), 2014 to current;
- **Affiliated Key Researcher** for inhalation Product Design and Development, Research Center Pharmaceutical Engineering GmbH, Graz, (Austria), 2016 to current.

1. Education and Awards

- December 2017, Drug Delivery to the Lungs **Emerging Scientist Award** by the Aerosol Society UK. The award recognises significant scientific accomplishment or innovation during the early stages of an individual's career in inhalation science;
- April 2017, **Associate Professor** qualification by the National Scientific Italian Committee;
- November 2013 - December 2017, **Assistant Professor** position (RTDb), Department of Pharmacy of the University of Parma (Italy);
- April 2007- October 2013- **Post-Doc fellowship**, Department of Pharmacy of the University of Parma (Italy);
- March 2007, **PhD title** in Biopharmaceutics Pharmacokinetics (Pharmaceutical Technology Application), research program run at Department of Pharmacy, University of Parma and King's College London, subject titled "The inhaled administration of dry powder formulations";
- July 2003, **Licensed to practice as a pharmacist** at Faculty of Pharmacy of the University of Parma with a score of 227/250;
- September 1998- April 2003, **Degree in Pharmaceutical Science**, Faculty of Pharmacy of the University of Parma with full marks and honors, discussion of a thesis entitled "Insulin dry powders for inhalation";
- 2002, **Undergraduate Student Award** in Pharmaceutical Science, University of Parma.

2. International Research Experience

- 01-02-2013 / 30-04-2013: **Visiting Scientist** position at the *Institute of Pharmaceutical Science of King's College, London (UK)* under supervision of *Prof. Ben Forbes*. Research activities were dedicated to the *ex-vivo* bioequivalence investigation of beclomethasone dipropionate microparticle emitted by metered dose inhalers;

- 01-09-2012 / 30-11-2012: **Visiting Scientist** position at *Chiesi Ltd, Chippenham (UK)* under supervision of *Dr. David Lewis* and *Dr. Gaetano Brambilla*. Research activities were dedicated to the preparation and characterization of novel metered dose inhaler formulations;

- 2006-2007: 12 months, as **PhD student**, at the *Institute of Pharmaceutical Science of King's College, London, (UK)* under the supervision of *Prof. Christopher Marriott* and *Prof. Stuart Jones*. Research program designed to explore and optimize the formulation and characterisation of budesonide dry powders for inhalation by atomic force microscopy.

3. Role in the Italian and International Committee of evaluation procedures, Associations and Journals

Prof Buttini is actively involved since 6 years as external expert of AIFA (Italian Agency of Drugs) in the evaluation of decentralised procedure for the market authorization of new inhalation medicines;

Francesca has been enrolled by the *Health and Medical Research Fund under The Government of the Hong Kong Special Administrative Region* and by the *National Research Foundation of South Africa* to evaluate and review grants submitted for funding;

She has been a committee member of the European COST Action MP1404 (2015-2019): Simulation and pharmaceutical technologies for advanced patient-tailored inhaled medicines (SimInhale);

Finally, Prof Buttini is in the Editorial Advisory Board of *AAPS PharmSciTech* and *Drug Development and Industrial Pharmacy* peer reviewed journals.

4. Role in Scientific and Organizing Committee of Congress and Conferences

She was enrolled in the scientific board of “Drug Delivery to the Lungs” conference from 2015 to 2019.

She is in the organizing committee of the international conference “Inhaled Therapies for Tuberculosis and Other Infectious Diseases”;

She was enrolled in the faculty board of XIV CONGRESSO NAZIONALE DEL VENTENNALE SIAM (SOCIETA' ITALIANA PER GLI AEROSOL IN MEDICINA). February, 14-16 2019, Milano

She was enrolled in the scientific board of “In & Out of inhalation therapy” congress. October 18-19 Firenze

5. Research Grants / Scholarship

- September 2020: Call of the University of Parma for biomedical research projects for SARS-CoV-2 and COVID-19. Role: **scientific leader of the operating formulation unit**. Principal investigator Prof Barbara Montanini, University of Parma. Title of project: The interaction between the human ACE2 receptor and the SARS-CoV-2 Spike protein as the target of an integrated approach for preventing virus internalization. Budget allocated and funded: 47,700.00 Euro;

- May 2018: South African Medical Research Council Project (SAMRC-RFA-EMU-02-2017). Role: **scientific leader of the operating unit** responsible for project and formulation development. Principal investigator Prof Keertan Dheda, University of Cape Town. Title of the project: Centre for the Study of Anti-Microbial Resistance (CAMRA). Budget allocated and funded on our specific unit: 60,000.00 Euro;

- August 2016: Horizon 2020 Framework Programme Call for proposals: H2020-NMBP-2016-2017 (H2020-NMBP-2016-Nanoformulation of biologicals). Funded of the Proposal: 720834 — CUPIDO. Role: Prof Francesca Buttini **scientific leader** on behalf of PlumeStars unit and responsible for project and formulation

development. Budget allocated and funded on our specific unit: 300,000.00 Euro;

- February 2012- November 2013: project entitled "Handling of solid state of drug and carrier particles to improve the biopharmaceutical properties". Role: **scientific leader/senior researcher** at Biopharmanet_TEC Interdepartmental Centre of the University of Parma;
- January 2009 / January 2012: project entitled: "Pulmonary administration of peptides and aminoglycoside antibiotics". Role: **scientific leader/senior researcher** at Pharmaceutical Department of the University of Parma;
- January – December 2008: Post-doctoral fellowship funded by *Chiesi Farmaceutici spa (Parma, IT)* entitled: "Study of the surface characteristics of carmoterol microparticles by atomic force microscopy" Role: **scientific leader/senior researcher**;
- June – December 2007: Post-doctoral fellowship funded by *Chiesi Farmaceutici spa (Parma, IT)* project entitled: "Investigation of the dissolution rate of Beclomethasone dipropionate emitted by metered dose inhalers" Role: **scientific leader/senior researcher**;
- January 2004 / December 2006: project entitled: "Innovative formulation and administration of dry powder inhalers" Role: **PhD student** at Pharmaceutical Department at the University of Parma. Project funded by *Chiesi Farmaceutici (Parma, IT)*;
- May-December 2003: project entitled "Powder agglomerates of morphine for nasal administration" Role: **junior researcher** funded by *Fidia SpA (Padova, IT)*.

6. Industrial Projects and collaborations

Francesca is leading industrial projects that concern development and characterisation of inhalation product and device optimization at the University of Parma. She has been funded to support collaboration with industries and associated projects from pharmaceutical companies such as: Pikdare Spa (Como, IT), Aboca Spa (San Sepolcro, IT), Beurer GmbH (Ulm, Germany), Bioseutica (Zeewolde, The Netherlands), Bormioli Spa (Parma, IT), Chiesi Farmaceutici Spa (Parma, IT), Hangzhou Changxi (Hangzhou, China), Globalcare (Hong Kong, China), Qualicaps (Madrid, SP) and Neupharma (Imola, IT).

7. Details of the teaching activity

- Teaching at the *Department of Pharmacy of the University of Parma*:
Lecturer as course leader of: "*Pharmaceutical technology and laboratory of galenic preparations*" since 2013 academic year (Master of Science in Pharmacy, Faculty of Pharmacy, Parma);
Lecturer for the course: "*Dietary Products*" for the 2010-2011 academic year (Master of Science in Pharmacy, Faculty of Pharmacy, Parma);
Lecturer for the course: "*Release targeting of drugs*" (Degree in Chemistry and Pharmaceutical Technology, Faculty of Pharmacy, Parma), during the years 2007-2013;
Lecturer for the course: "*Pharmaceutical Legislation/Innovative Pharmaceutical Forms*" (Master of Science in Pharmacy, Faculty of Pharmacy, Parma), during the years 2007-2012;
Lecturer for the course: *European Lifelong Learning Program/Erasmus Intensive Program*. "*Advanced Delivery Strategies for Pharmaceuticals and Cosmetics*". Lyon 8th October 2010.
- Teaching at the *Institute of Pharmaceutical Science of King's College, London, (UK)*: RMS9-Laboratory class, evaluation of inhalers performance, MPharm course, from 2015 to current.
- Member of the Board of PhD in "Science of drug, biomolecules and their formulation" since 2016 and of the board of a II Level Master in "Regulatory Aspect and Pharmaceutical Technology" at the

Student research supervision

9 PhD thesis (Biopharmaceutics-Pharmacokinetics) at the Department of Pharmacy of the University of Parma during the years 2010-2021;

48 MPharm thesis (6 month laboratory projects) at the Department of Pharmacy of the University of Parma during 2009-2021;

30 MPharm thesis (non-laboratory projects) at the Faculty of Pharmacy of the University of Parma during 2009-2021.

8. Scientific Activity Detail

Prof Buttini started the academic career at the University of Parma, Faculty of Pharmacy, as PhD student, she was nominated Associate Professor in 2018 (current position). Prof Buttini lead a research unit at the University of Parma dedicated to development of pharmaceutical products for inhalation as Head of the team and associated Research programs.

Prof. Buttini has published **77 original papers**, **6 book chapters** and **4 patent deposits** on drugs and drug delivery systems. Since 2007 she received **36 invitations to lecture** at national and international conferences and courses. She presented his research in more than 50 conference and scientific meetings. Prof Buttini collaborates with many international institutions and/or Research Centers such as: King's College London (UK), University of Sydney (Australia), University of Kiel (Germany), University of New Mexico (USA) and Research Center Pharmaceutical Engineering GmbH (Graz, Austria).

In 2013 Prof Buttini participated in the creation of the small-medium innovative enterprise PlumeStars Srl, aimed to develop innovative formulation and technologies for rare disease treatment.

9. Scientific papers on international journals

1. Rossi, I.; Spagnoli, G.; **Buttini, F.**; Sonvico, F.; Stellari, F.; Cavazzini, D.; Chen, Q.; Müller, M.; Bolchi, A.; Ottonello, S.; Bettini, R. A Respirable HPV-L2 Dry-Powder Vaccine with GLA as Amphiphilic Lubricant and Immune-Adjuvant. *J Control Release* **2021**, 340, 209–220.
2. **Buttini, F.**; Quarta, E.; Allegrini, C.; Lavorini, F. Understanding the Importance of Capsules in Dry Powder Inhalers. *Pharm* **2021**, 13 (11), 1936.
3. Quarta, E.; Sonvico, F.; Bettini, R.; Luca, C. D.; Dotti, A.; Catalucci, D.; Iafisco, M.; Esposti, L. D.; Colombo, G.; Trevisi, G.; Rekkas, D. M.; Rossi, A.; Wong, T. W.; **Buttini, F.***; Colombo, P. Inhalable Microparticles Embedding Calcium Phosphate Nanoparticles for Heart Targeting: The Formulation Experimental Design. *Pharm* **2021**, 13 (11), 1825.
4. Villetti, M. A.; Clementino, A. R.; Dotti, I.; Ebani, P. R.; Quarta, E.; **Buttini, F.**; Sonvico, F.; Bianchera, A.; Borsali, R. Design and Characterization of Maltoheptaose-b-Polystyrene Nanoparticles, as a Potential New Nanocarrier for Oral Delivery of Tamoxifen. *Molecules* **2021**, 26 (21), 6507.
5. Sonvico, F.; Chierici, V.; Varacca, G.; Quarta, E.; D'Angelo, D.; Forbes, B.; **Buttini, F.***. RespiCellTM: An Innovative Dissolution Apparatus for Inhaled Products. *Pharm* **2021**, 13 (10), 1541.
6. Benetti, A. A.; Bianchera, A.; **Buttini, F.**; Bertocchi, L.; Bettini, R. Mannitol Polymorphs as Carrier in DPIs Formulations: Isolation Characterization and Performance. *Pharm* **2021**, 13 (8), 1113.
7. Clementino, A.; Velasco-Estevez, M.; **Buttini, F.**; Sonvico, F.; Dev, K. K. Hybrid Nanoparticles as a Novel Tool for Regulating Psychosine-Induced Neuroinflammation and Demyelination In Vitro and Ex Vivo. *Neurotherapeutics* **2021**, 1–15.

8. Rossi, I.; Bettini, R.; **Buttini, F***. Resistant Tuberculosis: The Latest Advancements of Second-Line Antibiotic Inhalation Products. *Curr Pharm Design* **2021**, 27 (12), 1436–1452.
9. Bianchera, A.; **Buttini, F.**; Bettini, R. Micro/nanosystems and biomaterials for controlled delivery of antimicrobial and anti-biofilm agents. *Expert Opin Ther Pat* **2020** 30(12), 983-1000.
10. Pinto, J. T.; Wutscher, T.; Stankovic-Brandl, M.; Zellnitz, S.; Biserni, S.; Mercandelli, A.; Kobler, M.; **Buttini, F.**; Andrade, L.; Daza, V.; Ecenarro, S.; Canalejas, L.; Paudel, A. Evaluation of the Physico-Mechanical Properties and Electrostatic Charging Behavior of Different Capsule Types for Inhalation Under Distinct Environmental Conditions. *AAPS Pharmscitech* **2020**, 21 (4), 128;
11. Rodrigues, S.; Cunha, L.; Rico, J.; Costa, A. M. R. da; Almeida, A. J.; Faleiro, M. L.; **Buttini, F.**; Grenha, A. Carrageenan from Red Algae: An Application in the Development of Inhalable Tuberculosis Therapy Targeting the Macrophages. *Drug Deliv Transl Re* **2020**, 1–13;
12. Quarta, E.; Chierici, V.; Flammini, L.; Tognolini, M.; Barocelli, E.; Cantoni, A. M.; Dujovny, G.; Ecenarro, S.; Sonvico, F.; Colombo, G.; Rossi, A.; Bettini, R.; Colombo, P.; **Buttini, F***. Excipient-Free Pulmonary Insulin Dry Powder: Pharmacokinetic and Pharmacodynamics Profiles in Rats. *J Controlled Release* **2020**, 323, 412–420;
13. Rodrigues, S.; Costa, A. M. R. da; Flórez-Fernández, N.; Torres, M. D.; Faleiro, M. L.; **Buttini, F.**; Grenha, A. Inhalable Spray-Dried Chondroitin Sulphate Microparticles: Effect of Different Solvents on Particle Properties and Drug Activity. *Polymers* **2020**, 12 (2), 425;
14. Marengi, G.; Clementino, A. R.; Fioni, A.; **Buttini, F.**; Sonvico, F. Pulmonary Delivery of a P38 α/β MAP Kinase Inhibitor: Bioanalytical Method Validation and Biodistribution in Rat Plasma and Respiratory Tissues. *European J Pharm Sci Official J European Fed Pharm Sci* **2020**, 149, 105341;
15. Chierici, V.; Cavalieri, L.; Piraino, A.; Paleari, D.; Quarta, E.; Sonvico, F.; Melani, A. S.; **Buttini, F***. Consequences of Not-Shaking and Shake-Fire Delays on the Emitted Dose of Some Commercial Solution and Suspension Pressurized Metered Dose Inhalers. *Expert Opin Drug Del* **2020**, 17(7), 1025-1039;
16. Cunha, L.; Rodrigues, S.; Costa, A. M. R. da; Faleiro, L.; **Buttini, F.**; Grenha, A. Inhalable Chitosan Microparticles for Simultaneous Delivery of Isoniazid and Rifabutin in Lung Tuberculosis Treatment. *Drug Development and Industrial Pharmacy* **2019**, 28, 1–8;
17. Kozáková, J.; Altay, A.; Ždímal, V.; Mašková, L.; Sonvico, F.; Quarta, E.; Rossi, A.; **Buttini, F.***; Colombo, G. Dry Powder Inhaler of Colistimethate Sodium for Lung Infections in Cystic Fibrosis: Optimization of Powder Construction. *Drug Development and Industrial Pharmacy* **2019**, 45 (10), 1664–1673;
18. Rossi, I.; **Buttini, F.**; Sonvico, F.; Affaticati, F.; Martinelli, F.; Annunziato, G.; Machado, D.; Viveiros, M.; Pieroni, M.; Bettini, R. Sodium Hyaluronate Nanocomposite Respirable Microparticles to Tackle Antibiotic Resistance with Potential Application in Treatment of Mycobacterial Pulmonary Infections. *Pharmaceutics* **2019**, 11 (5), 203;
19. Fasiolo, L. T.; Manniello, M. D.; Bortolotti, F.; **Buttini, F.**; Rossi, A.; Sonvico, F.; Colombo, P.; Valsami, G.; Colombo, G.; Russo, P. Anti-Inflammatory Flurbiprofen Nasal Powders for Nose-to-Brain Delivery in Alzheimer's Disease. *J Drug Target* **2019**, 27 (9), 984–994;
20. Adorni, G.; Seifert, G.; **Buttini, F.**; Colombo, G.; Stecanella, L. A.; Krämer, I.; Rossi, A. Aerosolization Performance of Jet Nebulizers and Biopharmaceutical Aspects. *Pharmaceutics* **2019**, 11 (8), 406;
21. Lorenzoni, R.; Cordenonsi, L. M.; Davies, S.; Antonow, M. B.; Diedrich, A. S. M.; Santos, C. G.; Vitalis, G. S.; Garrastazu, G.; **Buttini, F.**; Sonvico, F.; Gomes, P.; Raffin, R. P. Lipid-Core Nanocapsules Are an Alternative to the Pulmonary Delivery and to Increase the Stability of Statins. *Journal of microencapsulation* **2019**, 36 (4), 317–326;
22. Maretti, E.; Rustichelli, C.; Gualtieri, M. L.; Costantino, L.; Siligardi, C.; Miselli, P.; **Buttini, F.**; Montecchi, M.; Leo, E.; Truzzi, E.; Iannuccelli, V. The Impact of Lipid Corona on Rifampicin Intramacrophagic Transport Using Inhaled Solid Lipid Nanoparticles Surface-Decorated with a Mannosylated Surfactant. *Pharmaceutics* **2019**, 11 (10), 508;

23. **Buttini, F. ***; Balducci, A. G.; Colombo, G.; Sonvico, F.; Montanari, S.; Pisi, G.; Rossi, A.; Colombo, P.; Bettini, R. Dose Administration Maneuvers and Patient Care in Tobramycin Dry Powder Inhalation Therapy. *Int J Pharm* **2018**, 548 (1), 182–191;
24. Sonvico, F.; Clementino, A.; **Buttini, F.**; Colombo, G.; Pescina, S.; Stanisçuaski Guterres, S.; Raffin Pohlmann, A.; Nicoli, S. Surface-Modified Nanocarriers for Nose-to-Brain Delivery: From Bioadhesion to Targeting. *Pharmaceutics* **2018**, 10 (1), 34;
25. **Buttini, F.**; Rozou, S.; Rossi, A.; Zoumpliou, V.; Rekkas, D. M. The Application of Quality by Design Framework in the Pharmaceutical Development of Dry Powder Inhalers. *Eur J Pharm Sci* **2018**, 113, 64-76;
26. Cunha, L.; Rodrigues, S.; da Costa, A. R.; Faleiro, M.; **Buttini, F.**; Grenha, A. Inhalable Fucoidan Microparticles Combining Two Antitubercular Drugs with Potential Application in Pulmonary Tuberculosis Therapy. *Polymers* **2018**, 10 (6), 636;
27. Fasiolo, L. T.; Manniello, M. D.; Tratta, E.; **Buttini, F.**; Rossi, A.; Sonvico, F.; Bortolotti, F.; Russo, P.; Colombo, G. Opportunity and Challenges of Nasal Powders_ Drug Formulation and Delivery. *Eur J Pharm Sci* **2018**, 113, 2–17;
28. Bella, Della, A.; Salomi, E.; **Buttini, F.**; Bettini, R. The Role of the Solid State and Physical Properties of the Carrier in Adhesive Mixtures for Lung Delivery. *Expert Opin Drug Deliv* **2018**, 15(7), 665-674;
29. Rossi, I.; Sonvico, F.; McConville, J. T.; Rossi, F.; Fröhlich, E.; Zellnitz, S.; Rossi, A.; Del Favero, E.; Bettini, R.; **Buttini, F***. Nebulized Coenzyme Q10 Nanosuspensions: a Versatile Approach for Pulmonary Antioxidant Therapy. *Eur J Pharm Sci* **2018**, 113, 159-170;
30. Maretti, E.; Costantino, L.; **Buttini, F.**; Rustichelli, C.; Leo, E.; Truzzi, E.; Iannuccelli, V. Newly Synthesized Surfactants for Surface Mannosylation of Respirable SLN Assemblies to Target Macrophages in Tuberculosis Therapy. *Drug Deliv. and Transl. Res.* **2018**, 8, 958–13;
31. Cunha, L.; Costa, A. M. R. da; Lourenço, J. P.; **Buttini, F.**; Grenha, A. Spray-Dried Fucoidan Microparticles for Pulmonary Delivery of Antitubercular Drugs. *J Microencapsul* **2018**, 35 (4), 392–405.
32. Akdag Cayli, Y.; Sahin, S.; **Buttini, F.**; Balducci, A. G.; Montanari, S.; Vural, I.; Oner, L. Dry Powders for the Inhalation of Ciprofloxacin or Levofloxacin Combined with a Mucolytic Agent for Cystic Fibrosis Patients. *Drug Dev Ind Pharm* **2017**, 10, 1–12;
33. De Boer, A. H.; Hagedoorn, P.; Hoppentocht, M.; **Buttini, F.**; Grasmeijer, F.; Frijlink, H. W. Dry Powder Inhalation: Past, Present and Future. *Expert Opin Drug Deliv* **2017**, 14(4), 499-512;
34. Maretti, E.; Costantino, L.; Rustichelli, C.; Leo, E.; Croce, M. A.; **Buttini, F.**; Truzzi, E.; Iannuccelli, V. Surface Engineering of Solid Lipid Nanoparticle Assemblies by Methyl A-D-Mannopyranoside for the Active Targeting to Macrophages in Anti-Tuberculosis Inhalation Therapy. *Int J Pharm* **2017**, 528 (1-2), 440–451;
35. Martinelli, F.; Balducci, A. G.; Kumar, A.; Sonvico, F.; Ben Forbes; Bettini, R.; **Buttini, F***. Engineered Sodium Hyaluronate Respirable Dry Powders for Pulmonary Drug Delivery. *Int J Pharm* **2017**, 517 (1-2), 286–295;
36. Rodrigues, S.; Alves, A. D.; Cavaco, J. S.; Pontes, J. F.; Guerreiro, F.; da Costa, A. M. R.; **Buttini, F.**; Grenha, A. Dual Antibiotherapy of Tuberculosis Mediated by Inhalable Locust Bean Gum Microparticles. *Int J Pharm* **2017**, 529 (1-2), 433–441;
37. Colombo, G.; Bortolotti, F.; Chiapponi, V.; **Buttini, F.**; Sonvico, F.; Invernizzi, R.; Quaglia, F.; Danesino, C.; Pagella, F.; Russo, P.; Bettini, R.; Colombo, P.; Rossi, A. Nasal Powders of Thalidomide for Local Treatment of Nose Bleeding in Persons Affected by Hereditary Hemorrhagic Telangiectasia. *Int J Pharm* **2016**, 514 (1), 229–237;
38. Benetti, C.; Flammini, L.; Vivo, V.; Colombo, P.; Colombo, G.; Elviri, L.; Scarpignato, C.; **Buttini, F.**; Bettini, R.; Barocelli, E.; Rossi, A. Esomeprazole Immediate Release Tablets: Gastric Mucosa Ex Vivo Permeation, Absorption and Antisecretory Activity in Conscious Rats. *J Control Release* **2016**, 239, 203–210;
39. Maretti, E.; Rustichelli, C.; Romagnoli, M.; Balducci, A. G.; **Buttini, F.**; Sacchetti, F.; Leo, E.; Iannuccelli, V. Solid Lipid Nanoparticle Assemblies (SLNas) for an Anti-TB Inhalation Treatment-a Design of Experiments Approach to Investigate the Influence of Pre-Freezing Conditions on the Powder Respirability. *Int J Pharm*

2016, 511 (1), 669–679;

40. **Buttini, F.***; Rossi, I.; Di Cuia, M.; Rossi, A.; Colombo, G.; Elviri, L.; Sonvico, F.; Balducci, A. G. Combinations of Colistin Solutions and Nebulisers for Lung Infection Management in Cystic Fibrosis Patients. *Int J Pharm* **2016**, 502 (1-2), 242–248;
41. Lopes, C. M.; Bettencourt, C.; Rossi, A.; **Buttini, F.**; Barata, P. Overview on Gastroretentive Drug Delivery Systems for Improving Drug Bioavailability. *Int J Pharm* **2016**, 510 (1), 144–158;
42. **Buttini, F.**; Hannon, J.; Saavedra, K.; Rossi, I.; Balducci, A. G.; Smyth, H.; Clark, A.; Colombo, P. Accessorized DPI: a Shortcut Towards Flexibility and Patient Adaptability in Dry Powder Inhalation. *Pharm Res* **2016**, 33(12), 3012-3020;
43. **Buttini, F.**; Brambilla, G.; Copelli, D.; Sisti, V.; Balducci, A. G.; Bettini, R.; Pasquali, I. Effect of Flow Rate on In Vitro Aerodynamic Performance of NEXThaler® in Comparison with Diskus® and Turbohaler® Dry Powder Inhalers. *Journal of aerosol medicine and pulmonary drug delivery* **2016**, 29 (2), 167–178;
44. Martinelli, F.; Balducci, A. G.; Rossi, A.; Sonvico, F.; Colombo, P.; **Buttini, F.*** “Pierce and Inhale” Design in Capsule Based Dry Powder Inhalers: Effect of Capsule Piercing and Motion on Aerodynamic Performance of Drugs. *Int J Pharm* **2015**, 487, 197-204;
45. Rossi, A.; Conti, C.; Colombo, G.; Castrati, L.; Scarpignato, C.; Barata, P.; Sandri, G.; Caramella, C.; Bettini, R.; **Buttini, F.**; Colombo, P. Floating Modular Drug Delivery Systems with Buoyancy Independent of Release Mechanisms to Sustain Amoxicillin and Clarithromycin Intra-Gastric Concentrations. *Drug Dev Ind Pharm* **2015**, 42(2), 1–8;
46. Balducci, A. G.; Steckel, H.; Guarneri, F.; Rossi, A.; Colombo, G.; Sonvico, F.; Cordts, E.; Bettini, R.; Colombo, P.; **Buttini, F.*** High Shear Mixing of Lactose and Salmeterol Xinafoate Dry Powder Blends: Biopharmaceutic and Aerodynamic Performances. *Journal of Drug Delivery Science and Technology* **2015**, 30B, 443–449;
47. Barbieri, S.; **Buttini, F.**; Rossi, A.; Bettini, R.; Colombo, P.; Ponchel, G.; Sonvico, F.; Colombo, G. Ex vivo permeation of tamoxifen and its 4-OH metabolite through rat intestine from lecithin/chitosan nanoparticles. *Int J Pharm* **2015**, 491 (1-2), 99–104;
48. Belotti, S.; Rossi, A.; Colombo, P.; Bettini, R.; Rekkas, D.; Politis, S.; Colombo, G.; Balducci, A. G.; **Buttini, F.*** Spray-Dried Amikacin Sulphate Powder for Inhalation in Cystic Fibrosis Patients: the Role of Ethanol in Particle Formation. *Eur J Pharm Biopharm* **2015**, 93, 165-172;
49. Garrastazu Pereira, G.; Lawson, A. J.; **Buttini, F.**; Sonvico, F. Loco-Regional Administration of Nanomedicines for the Treatment of Lung Cancer. *Drug Deliv* **2015**, 2881-2896;
50. Hassoun, M.; Ho, S.; Muddle, J.; **Buttini, F.**; Parry, M.; Hammond, M.; Ben Forbes. Formulating powder-device combinations for salmeterol xinafoate dry powder inhalers. *International Journal of Pharmaceutics*. *Int J Pharm* **2015**, 490 (1-2), 360–367;
51. **Buttini, F.***; Pasquali, I.; Brambilla, G.; Copelli, D.; Alberi, M. D.; Balducci, A. G.; Bettini, R.; Sisti, V. Multivariate Analysis of Effects of Asthmatic Patient Respiratory Profiles on the in Vitro Performance of a Reservoir Multidose and a Capsule-Based Dry Powder Inhaler. *Pharm Res* **2015**, 33(3), 701–715;
52. **Buttini, F.***; Miozzi, M.; Balducci, A. G.; Royall, P. G.; Brambilla, G.; Colombo, P.; Bettini, R.; Ben Forbes. Differences in Physical Chemistry and Dissolution Rate of Solid Particle Aerosols From Solution Pressurised Inhalers. *Int J Pharm* **2014**, 465 (1-2), 42–51;
53. Belotti, S.; Rossi, A.; Colombo, P.; Bettini, R.; Rekkas, D.; Politis, S.; Colombo, G.; Balducci, A. G.; **Buttini, F.*** Spray Dried Amikacin Powder for Inhalation in Cystic Fibrosis Patients: a Quality by Design Approach for Product Construction. *Int J Pharm* **2014**, 471 (1-2), 507–515;
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10. Patents

- P1. Renata P. Raffin, Paolo Colombo, Fabio Sonvico, Gaia Colombo, Alessandra Rossi, **Francesca Buttini**. *Compositions in powder form made of soft agglomerates of a micronized drug and of a two-components excipient, and process for their preparation*. (PCT/EP2007/061559, Applicant: University of Parma);
- P2. **Francesca Buttini**, Paolo Colombo, Chiara Parlati, Rossella Musa, Daniela Cocconi. *Microparticles comprising a salt of 8-hydroxy-2-[[[(1R)-2-(4-methoxyphenyl)-1-methylethyl]amino]ethyl]-2(1H)-quinolinone having improved adhesion properties for dry powder inhalation*. (WO 2010/060529 A8, Applicant: Chiesi Farmaceutici Spa);
- P3. **Francesca Buttini**, Paolo Colombo, Chiara Parlati. *A drug powder for inhalation administration and a process thereof*. (PCT/EP2008/059110, Applicant: University of Parma);

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11. Book Chapters

- B1. P. Colombo, F. Sonvico, **F. Buttini**. Nanostructures for overcoming the pulmonary barrier: drug delivery strategies. In RCS Drug Discovery Series N°22. Edited by Maria Jose Alonso and Noemi S. Casba. Published by the Royal Society of Chemistry (**2012**) pp. 273-299. ISBN: 978-1-84973-363-2;
- B2. **F Buttini**, G Colombo, PL Kwok, WT Wui. Aerodynamic assessment for inhalation products: fundamentals and current pharmacopoeial methods. In P Colombo, D Traini, F Buttini. *Inhalation Drug Delivery: Techniques and Products*. Wiley-Blackwell; 1 edition (**2013**); ISBN-10: 1118354125, pp. 91-119;
- B3. P Colombo, WT Wui, **F Buttini**. Quality of Inhalation Products: Specifications. In P Colombo, D Traini, F Buttini. *Inhalation Drug Delivery: Techniques and Products*. Wiley-Blackwell; 1 edition (**2013**); ISBN-10: 1118354125, pp. 169-190;
- B4. Balducci, A.G., Bettini, R., Colombo, P., **Buttini, F.**, Drug Delivery Strategies for Pulmonary Administration of Antibiotics. In Nokhodchi A, Martin GP, editors. *Pulmonary Drug Delivery: Advances and Challenges*, Wiley-Blackwell; **2015**, 241-262. Print ISBN: 9781118799543;
- B5. Forbes, B., Richer, N. H., **Buttini F**, Dissolution: a Critical Performance Characteristic of Inhaled Products?; Advances and Challenges. In Nokhodchi A, Martin GP, editors. *Pulmonary Drug Delivery: Advances and Challenges*, Wiley-Blackwell; **2015**, 223-240. Print ISBN: 9781118799543;
- B6. **Buttini, F.**; Colombo, G. Formulation Strategies for Antitubercular Drugs by Inhalation; John Wiley & Sons, Ltd: Chichester, UK, **2016**; pp 197–212. Print ISBN: 9781118943175.
- B7. Lavorini, F.; **Buttini, F.**; Usmani, O. S. 100 Years of Drug Delivery to the Lungs. *Handbook of experimental pharmacology* **2019**, 260 (1–2), 143–159.

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Inhalation Drug Delivery: Techniques and Products. Wiley-Blackwell; 1 edition (2013); ISBN-10: 1118354125.

12. Invited Lectures

- Ci1. *New Technology for Aerosol Administration*. Third European Respiratory Care Association Congress. Stresa, April 2-4, **2009**;
- Ci2. *L'utilizzo dell'AFM nello Sviluppo di Prodotti Farmaceutici*. Università di Parma, Centro Interdipartimentale Misure. Corso di perfezionamento in tecniche di microscopia a forza atomica.: Parma, 29 May **2009**;
- Ci3. *La somministrazione inalatoria, tecnologie e prodotti*. Baranzate (MI). Nikem Research srl. 14 July **2009**;
- Ci4. *Caratterizzazione di particelle di beclometasone dipropionato emesse da preparati inalatori pressurizzati*. 50° Simposio AFI. 9-11 June **2010**. Rimini, IT;
- Ci5. *La Somministrazione Inalatoria: Prodotti, Strategie Formulative e Caratterizzazione dei Preparati*. Dipartimento di Chimica e Tecnologie del Farmaco, in collaborazione con Alfatest e Malvern Instruments. Esperienze applicative e Soluzioni strumentali per la caratterizzazione di sistemi Micro e Nanometrici. Università La Sapienza, Roma, 24 June **2010**;
- Ci6. *Nebulizzazione di colimicina con nebulizzatore I-neb Respironics*. Meeting per Dompè Q-Rare. Hotel des Iles Borromees, Stresa, 31 August **2010**;

- Ci7. *Managing excipients in inhalation drug development: DPI options*. Informa Life Sciences. Inhalation Drug Development: Emerging Trends and Markets. 28 - 29 September **2010**, Ambassadors Bloomsbury, London UK;
- Ci8. *Science and Technology of Dry Powder Inhalers*. European Lifelong Learning Program/Erasmus Intensive Program. "Advanced Delivery Strategies for Pharmaceuticals and Cosmetics". Lyon 8th October **2010**;
- Ci9. *La Terapia Inalatoria JET Neb – Mesh technology*. Congresso Fibrosi Cistica: Nuove acquisizioni nella gestione della malattia polmonare. 15 -16 ottobre 2010, Resort Borgo San Luigi, Monteriggioni (Siena);
- Ci10. *La somministrazione inalatoria mediante Jet Neb & Mesh technology*. Congresso di Fisioterapia e riabilitazione respiratoria nella Fibrosi Cistica. 17-18 June **2011**, Gubbio, (Perugia);
- Ci11. *Polveri secche per somministrazione inalatoria*. XI Scuola Dottorale per la formazione avanzata in discipline tecnologico farmaceutiche. Università della Calabria, Rende (IT), 11-15 September **2011**;
- Ci12. *Examining dissolution testing for inhaled products*. Informa Life Sciences' Annual Conference on Inhalation Drug Development. 12-13 October 2011, London (UK);
- Ci13. *New Strategies to Improve Inhalation Therapy Performance*. The BIT's 1st Annual Symposium of Drug Delivery Systems 2011's. Shenzhen, China; November 4, **2011**;
- Ci14. *Examining dissolution testing for inhaled products*. University of Kiel, (DE), 26 April **2012**;
- Ci15. *Anti-infective agents for the treatment of lung infections*. International Conference on Pharmaceutical, Nutraceutical and Cosmeceutical Technology: Delivery, Discovery, Clinical and Manufacturing Chains 2012. Kuala Lumpur, Malaysia, 20-21 November **2012**;
- Ci16. *Insulin powder for nasal and pulmonary administration*. 53° AFI Symposium, 12-14 June 2013, Rimini (IT);
- Ci17. *Exploring the latest advances in inhalation formulation development*. Inhalation Drug Development Conference, Informa Life Sciences, 17-18 September **2013**, Berlin (DE);
- Ci18. *Particles, powders and inhalation products for tuberculosis treatment*. 2nd Conference on Inhaled therapies for Tuberculosis, 1-3 October **2013**, Tokyo (JP);
- Ci19. *DPI as effective tool to deliver high payload of drugs*. DPI, Management Forum Conference, 10-11 June **2015**, London (UK);
- Ci20. *High doses delivered as powders: convenience and compliance*. 3rd Conference on Inhaled Therapies for Tuberculosis and Other Infectious Diseases, 15-16 October **2015**, Parma (IT);
- Ci21. *Inhalation as alternative delivery option to increase patient adherence*. PDA Europe Workshop on Molded Glass: From Manufacturing Process to Applications, 11 April **2016**, Venice (IT);
- Ci22. *Antibiotic DPI: particles, powders, device and in vitro/in vivo respirability*. I3: Innovation in Inhalation, Chiesi Conference, 6-7 July **2016**, Newport (UK);
- Ci23. *Applicazione di disegni sperimentali per ottimizzare il processo produttivo e la qualità di polveri inalatorie*. Quality by Design, un'opportunità per l'industria farmaceutica, 3 February **2017** Padova (IT);
- Ci24. *Rational design for construction of antibiotic dry powder inhalers*. 2nd Annual Inhalation & Respiratory Drug Delivery Congress, Oxford Global, 8-9 May **2017**, London (UK);
- Ci25. *The AOS add-on device as a novel tool to improve powder dispersion*. Dry powder inhalers Annual conference, Management Forum, 27-29 June **2017**, London (UK);
- Ci26. *QbD microencapsulation approach applied to the development of inhalable antibiotic powders*. 21st International Symposium on Microencapsulation, 27-29 September **2017**, Faro (PT);
- Ci27. *Engineered microparticles and high powder dose administration*. 4th Conference on Inhaled Therapies for Tuberculosis and Other Infectious Diseases, 16-17 October **2017**, Durham (NC;US);
- Ci28. *Engineered microparticles for DPI construction and powder administration*. 28th Drug Delivery to the Lungs Conference, 6-8 December **2017** Edinburgh (UK);

- Ci29. Siminhale COST action MP1404 workshop: Particle Engineering and Device Development for Pulmonary Drug Delivery: What is new?. Inhaler Devices: from Bench to Bedside Belgrade, February 27-28, 2018;
- Ci30. The application of Quality by Design framework in the pharmaceutical development of dry powder inhalers. IPAC-RS Board of Directors meeting. Parma, 15 May **2018**;
- Ci31. Technological approaches for lung delivery of nanoparticles. Summer School in Nanomedicine, all'interno del dottorato internazionale NanoFar. 11 - 15 June **2018**;
- Ci32. High dose delivery utilising a DPI. 26th Annual Conference. Dry Powder Inhalers. Management Forum. 20-21 June **2018** London;
- Ci33. Tecnologia farmaceutica degli aerosol. xiv congresso nazionale del ventennale siam (societa' italiana per gli aerosol in medicina). 14-16 February **2019**, Milano;
- Ci34. "Excipients: their role for respirable particle construction". COST ACTION Siminhale International Conference on Current Challenges and Future Opportunities for Inhalation Therapies. 30 September – 2 October **2019**, Athens, Greece;
- Ci35. *In vitro* testing of pharmaceutical aerosol. In & Out of inhalation therapy. October 18-19 Firenze **2020**;
- Ci36. Respicell: a novel dissolution tool for the in vitro discrimination of inhalation formulation. 5th Annual Inhalation & Respiratory Drug Delivery Congress. Virtual Congress, 8-9 July **2020**.

17th January 2022

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