

Francesca Buttini

Curriculum Vitae of scientific and teaching activity

Personal Details

Date of birth: April 18th, 1979

Citizenship: Italian

E-mail: francesca.buttini@unipr.it

Current working address: University of Parma
Food and Drug Department
Parco Area delle Scienze 27/a,
43124 Parma, Italy
phone: +39 3393668918

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, **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);
- 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;
- 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 *Dr. 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 Limited, Chippenham (UK)* under supervision of *Dr. Dave 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 *Dr. 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

Dr 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 is enrolled in the scientific board of "Drug Delivery to the Lungs" conference as well as she is in the organizing committee of the international conference "Inhaled Therapies for Tuberculosis and Other Infectious Diseases";

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

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

4. Research Grants / Scholarship

- 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: Dr 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)*.

5. 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: Artsana Spa (Como, IT), Aboca Spa (San Sepolcro, IT), Beurer GmbH (Ulm, Germany), Bormioli Spa (Parma, IT), Chiesi Farmaceutici Spa (Parma, IT), Medel (Hong Kong, CH), Qualicaps (Madrid, SP) and Neupharma (Imola;IT).

6. 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, during the years 2015, 2016 and 2017.

- 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".

Student research supervision

5 PhD thesis (Biopharmaceutics-Pharmacokinetics) at the Department of Pharmacy of the University of Parma during the years 2010-2016;

32 MPharm thesis (6 month laboratory projects) at the Department of Pharmacy of the University of Parma

during 2009-2014;

22 MPharm thesis (non-laboratory projects) at the Faculty of Pharmacy of the University of Parma during 2009-2014.

7. Scientific Activity Detail

Dr 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). Dr 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.

Dr. Buttini has published **52 original papers, 6 book chapters and 4 patent deposits** on drugs and drug delivery systems. Since 2007 she received **27 invitations to lecture** at national and international conferences and courses. She presented his research in more than 50 conference and scientific meetings. Dr 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 Pharmaceutcial Engineering GmbH (Graz, Austria).

In 2013 Dr Buttini participated in the creation of a start up as co-founder - PlumeStars Srl, an innovative StartUp Co. aimed to develop innovative formulation and technologies for antibiotic powders in the field inhalation delivery.

8. Scientific papers on international journals

1. 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;
2. **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;
3. Cunha, L.; Rodrigues, S.; da Costa, A. R.; Faleiro, M.; **Buttini, F.**; Grenha, A. Inhalable Fucoïdan Microparticles Combining Two Antitubercular Drugs with Potential Application in Pulmonary Tuberculosis Therapy. *Polymers* **2018**, Vol. 10, Page 636 2018, 10 (6), 636;
4. 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;
5. 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;
6. **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;
7. 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;

8. 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;
9. 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;
10. 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;
11. 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;
12. 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;
13. 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;
14. 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;
15. **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**. *in press*;
16. 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- *Eur J Pharm Sci* **2018**, *113* (4), 499-512;
17. 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;
18. 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;
19. **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;
20. **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* **2016**, *33*(3), 701–715;
21. 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: Biopharmaceutical and Aerodynamic Performances. *Journal of Drug Delivery Science and Technology* **2015**, *30* (Part B), 443–449;

22. Garrastazu Pereira, G.; Lawson, A. J.; **Buttini, F.**; Sonvico, F. Loco-Regional Administration of Nanomedicines for the Treatment of Lung Cancer. *Drug Deliv* **2015**, 1–16;
23. **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. *J Aerosol Med Pulm Drug Deliv* **2015**, 28, 1-12;
24. 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;
25. Hassoun, M.; Ho, S.; Muddle, J.; **Buttini, F.**; Parry, M.; Hammond, M.; Ben Forbes. International Journal of Pharmaceutics. *Int J Pharm* **2015**, 490 (1-2), 360–367;
26. 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;
27. 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;
28. 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;
29. 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;
30. **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;
31. Lewis, D. A.; Young, P. M.; **Buttini, F.**; Church, T.; Colombo, P.; Forbes, B.; Haghi, M.; Johnson, R.; O'Shea, H.; Salama, R.; Traini, D. Towards the Bioequivalence of Pressurised Metered Dose Inhalers 1: Design and Characterisation of Aerodynamically Equivalent Beclomethasone Dipropionate Inhalers with and Without Glycerol as a Non-Volatile Excipient. *Eur J Pharm Biopharm* **2014**, 86 (1), 31–37;
32. Balducci, A. G.; Cagnani, S.; Sonvico, F.; Rossi, A.; Barata, P.; Colombo, G.; Colombo, P.; **Buttini, F.*** Pure Insulin Highly Respirable Powders for Inhalation. *Eur J Pharm Sci* **2014**, 51, 110-117;
33. Marin, L.; Traini, D.; Bebawy, M.; Colombo, P.; **Buttini, F.**; Haghi, M.; Ong, H. X.; Young, P. Multiple Dosing of Simvastatin Inhibits Airway Mucus Production of Epithelial Cells: Implications in the Treatment of Chronic Obstructive Airway Pathologies. *Eur J Pharm Biopharm* **2013**, 84 (3), 566–572;
34. Rossi, A.; **Buttini, F.**; Colombo, P.; Mor, M.; Pala, D.; Bortolotti, F.; Colombo, G. Complex product composition generates risks for generic substitution also with dosage forms for intravenous administration. *Int J Pharm* **2013**, 451 (1-2), 50–56;
35. Barbieri, S.; Sonvico, F.; Como, C.; Colombo, G.; Zani, F.; **Buttini, F.**; Bettini, R.; Rossi, A.; Colombo, P. Lecithin/Chitosan Controlled Release Nanopreparations of Tamoxifen Citrate: Loading, Enzyme-Trigger Release and Cell Uptake. *J Control Release* **2013**, 167 (3), 276–283;

36. Pomázi, A.; **Buttini, F.**; Ambrus, R.; Colombo, P.; Szabó-Révész, P. Effect of Polymers for Aerolisation Properties of Mannitolbased Microcomposites Containing Meloxicam. *European Polymer Journal* **2013**, *49*, 2518-2527;
37. **Buttini, F.**; Colombo, P.; Rossi, A.; Sonvico, F.; Colombo, G. Particles and Powders: Tools of Innovation for Non-Invasive Drug Administration. *J Control Release* **2012**, *161* (2), 693–702;
38. Grainger, C.; Saunders, M.; **Buttini, F.**; Telford, R.; Merolla, L. L.; Martin, G. P.; Jones, S. A.; Forbes, B. Critical Characteristics for Corticosteroid Solution Metered Dose Inhaler Bioequivalence. *Mol Pharm* **2012**, *9* (3), 563–569;
39. Balducci, A. G.; Colombo, G.; Corace, G.; Cavallari, C.; Rodriguez, L.; **Buttini, F.**; Colombo, P.; Rossi, A. Layered Lipid Microcapsules for Mesalazine Delayed-Release in Children. *Int J Pharm* **2011**, *421* (2), 293–300;
40. Parlati, C.; Colombo, P.; **Buttini, F.**; Young, P. M.; Adi, H.; Ammit, A. J.; Traini, D. Pulmonary Spray Dried Powders of Tobramycin Containing Sodium Stearate to Improve Aerosolization Efficiency. *Pharm Res* **2009**, *26* (5), 1084–1092;
41. Colombo, G.; Terzano, C.; Colombo, P.; Petroianni, A.; Ricci, A.; **Buttini, F***. Methacholine Dry Powder Inhaler as a New Tool for Bronchial Challenge Test. *Int J Pharm* **2008**, *352* (1-2), 165–171;
42. **Buttini, F.**; Colombo, P.; Wenger, M. P. E.; Mesquida, P.; Marriott, C.; Jones, S. A. Back to Basics: the Development of a Simple, Homogenous, Two-Component Dry-Powder Inhaler Formulation for the Delivery of Budesonide Using Miscible Vinyl Polymers. *J Pharm Sci* **2008**, *97* (3), 1257–1267;
43. **Buttini, F.**; Soltani, A.; Colombo, P.; Marriott, C.; Jones, S. A. Multilayer PVA Adsorption Onto Hydrophobic Drug Substrates to Engineer Drug-Rich Microparticles. *Eur J Pharm Sci* **2008**, *33* (1), 20–28;
44. Russo, P.; **Buttini, F.**; Sonvico, F.; Bettini, R.; Massimo, G.; Sacchetti, C.; Colombo, P.; Santi, P. Chimeral Agglomerates of Microparticles for the Administration of Caffeine Nasal Powders. *Journal of Drug Delivery Science and Technology* **2004**, *14* (6), 449–454.

15th January 2019

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