



Silvia Catena

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Curriculum vitae et studiorum

Personal Information

First Name Silvia

Last Name Catena

Sex Female

Birth Genova (Italy), 25/08/1993

Nationality Italian

Marital Status Single

Contacts

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Position

Period 2017 – Today

Position Ph.D. in Chemical and Materials Sciences and Technologies
(Tutors: Prof.ssa Paola Zunin e Prof.ssa Raffaella Boggia)

Area of Research Pharmaceutical, Food and Cosmetic Science

Institution University of Genoa, Department of Pharmacy

Carrier

Italian Pharmacist Licensure Examination

Period June 2018

Degree Pharmacist Professional Qualification

Grade 254/300

Bachelor studies

Period 2012 - 2017

Degree Master degree in Chemistry and Pharmaceutical Technology

Institution University of Genoa, Department of Pharmacy

Thesis "Construction of polyfunctional amphiphilic dendrimeric scaffolds derived from b-HMPA on tri- and tetra- functional kernels for use in gene therapy"

Date 24/10/2017

Grade 110/110 cum laude

High school diploma in Classics

Period 2007 - 2012

Degree "Diploma di Maturità Classica" **School** Liceo Classico "Giuseppe Mazzini", Genova

Grade 92/100

Professional skills

2017-Today: Ph.D. in Chemical and Materials Sciences and Technologies

My PhD project is carried out in the laboratory of **Chemistry of Food and Dietary Products** and it's mainly focused on the "**Green Extractions**" (eco-friendly innovative technologies) of **polyphenolic antioxidants** from some kinds of healthy foods, such as pomegranate and colored rice.

I use Pulsed Ultrasound-Assisted Extraction (**PUAE**).

I analyze the extracted bioactive compounds with **chromatographic and spectrophotometric techniques**, especially with **HPLC** and **UV-vis Spectrophotometer**.

I'm able to process data sets applying Multivariate Analysis, particularly Principal Component Analysis (**PCA**), and to optimize experimental methods conditions with Experimental Design (**DoE**).

I'm learning scientific communication skills, both writing a paper and public speaking.

I also started a new collaboration between my research group and that of organic chemistry with whom I developed my thesis work.

Particularly, my main project during the first year of work was about studying the **effects of different cooking conditions on the antioxidant content of a violet rice (*Oryza Sativa* L. 'Violet Nori')**; 'Violet Nori' is a new variety of aromatic brown rice spontaneously grown in Piedmont (Italy) which is very interesting for its healthy properties. **Anthocyanins**, the major water-soluble pigments which accumulate in the rice grain during maturation, have indeed antioxidant activity, but also other promoting health activities, such as anticancer and anti-inflammatory effects; in addition to anthocyanins, other classes of flavonoids have been identified in colored rice, namely flavonols and flavan-3-ols and contribute to its healthy properties. Ten different cooking tests (using four techniques: boiling, "risotto" cooking, "oriental" cooking and oven cooking) were professionally performed at an Hotel School of Genoa; then every sample, after drying and grinding, was subjected to ultrasound-assisted extraction in a solvent consisting in a mixture EtOH:H₂O and analyzed. The **total anthocyanin content** was determined by HPLC and by the spectrophotometric **pH differential method**; other two tests were performed by UV-Vis spectrometry: the **DPPH test** for the determination of Radical Scavenging Activity (**RSA**) and the **Folin test** which determines the value of the Total Phenolic Content (**TPC**). The results obtained showed that the best cooking condition allowing to preserve rice's healthy peculiar features (although cooking necessarily decreases its content of valuable antioxidants) is "oriental" cooking, consisting in boiling for 14 min without cap and for further 14 min with a sealed cup.

Another project, carried out during my first year, concerned the **increase of ellagic acid solubility by its entrapment into non PAMAM structured biocompatible dendrimer scaffolds** (which have been the subject of my master thesis). Ellagitannins and ellagic acid are bioactive polyphenols naturally present in numerous berries and nuts, such as in pomegranates, showing promising antioxidant, anticancer, anti-inflammatory, antimicrobial properties. The dietary intake of ellagic acid with nutrients is irrelevant for therapeutic purposes and integrating it with functional foods could be a valid solution but unfortunately its poor water solubility and accordingly its low bioavailability don't authorize its use as additive in food as well as its administration for clinical applications. With the aim to improve its bioavailability, ellagic acid was encapsulated into two different synthetic dendrimers (both of them having a unit of bis-HMPA as starting monomer for the construction: one characterized by a hydrophilic structure and the other by an amphiphilic one), in methanol under stirring in the dark for 24 h. The successful outcome of the **encapsulation** was assessed both qualitatively and quantitatively through FTIR and ¹H NMR technique. The new dendrimer formulations of ellagic acid (called **dendriplexes**) showed an optimal Drug Loading (46-53%) and above expectations a very high solubility in biocompatible solvents such as water (300 times higher than

free ellagic acid with the amphiphilic dendrimer and 1000 times with the hydrophilic one).

Oct 2018-Dec 2018: Laboratory Assistance

I assisted the second-year students of Pharmacy during the course “Drugs Analysis”. Laboratory exercises included:

Quantification of pharmaceutical compounds by **acid-base, redox and complexometric titrations**

Chromatographic separation of a drugs mixture (**column and thin-layer chromatography**).

2012-2017: Master degree in Chemistry and Pharmaceutical Technology

Principal **fields of study** are:

General and Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Physical Chemistry, Food Chemistry, Cosmetics Chemistry;

Phytochemistry, Animal and Plant Biology, Biochemistry, Physiology, Pathology;

Pharmaceutical Chemistry, Pharmacology and Toxicology, Pharmaceutical Technologies, Pharmaceutical Legislation.

2015-2017: Thesis On An Experimental Research Project

I carried out my Master’s thesis in the laboratory of **Organic Chemistry**.

I was involved in the construction of some kinds of hyperbranched and globular-shaped polymeric nanoparticles (called **dendrimers**), characterized by the presence of internal cavities and peripheral functional groups, as promising materials for various biomedical applications such as **drug delivery nanocarriers**, vectors for gene therapy, biosensors and bio-imaging agents.

I used to confirm the structures prepared by **FT-IR and ¹H and ¹³C NMR Spectroscopy**.

I had the opportunity to learn many methods of synthesis and purification.

2013-2017: Students' Union Representative

Thanks to this task, I could improve my **organizational and communication skills**.

Actually, I’ve always been in **leadership positions**, during high school and even before, when, at the age of 11, I was elected “**Young Mayor**” (“Sindaco dei ragazzi”) of Genoa, in the context of a project organized by the government of my city.

2016-2017: Internship at the pharmacy “Farmacia del Lagaccio”, Genova.

During this period, I have acquired a body of knowledge about rules on the **prescription and dispensing of medicines**, maintaining safe and clean working environment by complying with procedures and regulations.

Additional training

National and International Schools attended

24 June-26 June 2019: Summer School “Valorization of by-products from agri-food supply chains for the development of functional ingredients, foods and nutraceuticals”, San Floriano, Verona.

14 Jan-18 Jan 2019: Winter School-Combining NIR Spectroscopy and Chemometrics
Held by SISNIR (Società Italiana di Spettroscopia NIR), in Milano.

4-8 June 2018: School of Experimental Design

Held by the Research Group of Analytical Chemistry and Chemometrics of the Department of Pharmacy of the University of Genoa, in Genoa.

29 Jan-2 Feb 2018: School of Multivariate Analysis

Held by the Research Group of Analytical Chemistry and Chemometrics of the Department of Pharmacy of the University of Genoa, in Genoa.

National and International Workshops or Congresses attended

17-19 July 2019: XXII Reunión de la Sociedad Española de Química Analítica (SEQA).

University of Valladolid (Spain).

19 Oct 2018: First Workshop on “Sustainability and Microwave-Assisted Chemical Processes”

Held by SCI-gruppo interdivisionale Green Chemistry, in Genoa.

24-27 Sept 2018: Italian Food Chemistry Congress (CHIMALI – XII)

Held by the Interdivisional Group of Food Chemistry of the Italian Chemical Society (SCI), in Camerino.

2-4 July 2018: Spanish-Italian Symposium on Organic Chemistry (SISOC-XII)

Held by the Division of Organic Chemistry of the Società Chimica Italiana (SCI) and the Real Sociedad Española de Química, in Ferrara.

16-18 April 2018: Scientific conference IX French-Italian days about Chemistry

Held by the Ligurian Section of the Italian Chemical Society (SCI), in Genoa.

20 Jan 2018: Nutraceuticals Conference (second edition)

Held by SINut (Società Italiana Nutraceutica), in Pavia.

Personal skills

Languages

Italian Mother tongue

English Good understanding, speaking and writing. *Level B2*

Spanish Quite good understanding, speaking and writing

French Basic communication skills

Digital skills

Microsoft Office Good command (Word, Excel and Power-Point)

ChemDraw Good command

SciFinder Scholar Good command

Chemometric software

developed in R Quite good command

Dotto-Parvus Basic knowledge

PLSToolbox

(MatLab) Basic knowledge

Driving license

Italian Category B

Other works

2011-Today: Sales assistant from my family's delicatessen shop "Pasta Fresca Assirelli", Genova

2012-2016: Event hostess and children's entertainer for "Arte & Moda" Agency, Massa Carrara

Hobbies

Sports Tennis, Golf, Running, Skiing, Swimming, Cycling, Hiking.

Painting I'm attending a specific course of painting and drawing. I often paint to relax during my free time and I really appreciate art exhibitions.

Theatre I love going to the theatre, whether it's to attend an opera, a musical, a ballet or a prose show.

Travelling I started travelling very young, I have visited a lot of places around the world and I'm going to visit many more. I love meeting new people and new cultures. Moreover, ten years of **Scouting** improved my passion for new adventures and for nature and taught me to live in uncomfortable conditions and to share with others.

Research activity

Scientific Publications

S. Catena, F. Turrini, R. Boggia, M. Borriello, M. Gardella and P. Zunin. Effects of different cooking conditions on the antioxidant content of a violet rice (*Oryza Sativa* L. 'Violet Nori'), *Eur. Food Res. Technol*, 2019, <https://doi.org/10.1007/s00217-019-03337-6>

F. Turrini, R. Boggia, D. Donno, P. Zunin, G. Beccaro, S. Baldassari, M.G. Signorello, S. Catena, S. Alfei and B. Parodi. From pomegranate marcs to "polyphenol-plus" apples: a recycling proposal for pomegranate squeezing marcs, *Eur. Food Res. Technol*, 2019, <https://doi.org/10.1007/s00217-019-03339-4>

F. Turrini, P. Zunin, S. Catena, C. Villa, S. Alfei and R. Boggia. Traditional or hydro-diffusion and gravity microwave coupled with ultrasound as green technologies for the valorization of pomegranate external peels. *Food Bioprod. Process.*, 117 (2019) 30-37. <https://doi.org/10.1016/j.fbp.2019.06.014>.

S. Alfei, F. Turrini, S. Catena, P. Zunin, B. Parodi, G. Zuccari, A.M. Pittaluga and R. Boggia. Ellagic Acid micro and nano formulations with amazingly increased water solubility by its entrapment in pectin or nonPAMAM dendrimers eligible for clinical applications. *New J. Chem.* 2019. <https://doi.org/10.1039/C8NJ05657A>

S. Alfei, S. Catena, M. Ponassi, C. Rosano, V. Zoppi and A. Spallarossa. Hydrophilic and amphiphilic water-soluble dendrimer prodrugs suitable for parenteral administration of a non-soluble non-nucleoside HIV-1 reverse transcriptase inhibitor thiocarbamate derivative. *Eur. J. Phar. Sci.* 2018, 124:153-164. <https://doi.org/10.1016/j.ejps.2018.08.036>.

S. Alfei, S. Castellaro and S. Catena. Tert-Butoxycarbonyl Protecting Group Location Induces Different Reactive Behaviors in the Five Possible Isoforms of Tri-Boc-Arginine. *Chem. Select.* 2018, 31:8826-32. <https://doi.org/10.1002/slct.201801182>

S. Alfei and S. Catena. Synthesis and characterization of versatile amphiphilic dendrimers peripherally decorated with positive charged amino acids. *Polym. Int.* 2018, 67:1572-84. <https://doi.org/10.1002/pi.5680>.

S. Alfei and S. Catena. Synthesis and characterization of fourth generation polyester-based dendrimers with cationic amino acids-modified crown as promising water soluble biomedical devices. *Polym. Adv. Technol.* 2018, 29:2735-49. <https://doi.org/10.1002/pat.4396>.

S. Alfei, G. B. Taptue, S. Catena and A. Bisio. Water-soluble dendrimers loaded with Ursolic and Oleanolic Acids as promising prodrugs suitable for intravenous administration. *Chinese J. Polym. Sci.* 2018, 36:99-1010. <https://doi.org/10.1007/s10118-018-2124-9>.

Cover Image, Volume 67, Issue 11, Nov 2018, Polymer International, Silvana Alfei, Silvia Catena. The back cover image is based on the Research Article Synthesis and characterization of versatile amphiphilic dendrimers peripherally decorated with positively charged amino acids by Silvana Alfei and Silvia Catena, DOI: 10.1002/pi.5680.

Oral communications at Conferences

F. Turrini, R. Boggia, D. Donno, P. Zunin, G. Beccaro, S. Baldassari, S. Catena, M.G. Signorello. A recycling proposal for pomegranate marcs obtained after juice squeezing. Italian Food Chemistry Congress (CHIMALI – XII). Camerino, September 24-27, 2018. OC. 37, page 76 in the Book of Abstract.

F. Turrini, S. Alfei, S. Catena, P. Zunin, B. Parodi, G. Zuccari, A. M. Pittaluga and R. Boggia. Not PAMAM Dendrimer Nanodispersions and Pectine Microdispersion: two biocompatible approaches to increase Ellagic Acid water solubility and allow its more ways therapeutic administration. *XXXVIII Convegno Nazionale della Divisione di Chimica Organica (CDCO_2018)*. Milano, September 9-13, 2018. OC. 36, page 103 in the Book of Abstract.

S. Alfei, A. Spallarossa, S. Catena, F. Turrini, G. Zuccari, A. Pittaluga and R. Boggia. Non-PAMAM amino acids-modified dendrimers nanoparticles for enhancing water-solubility of insoluble bioactive molecules: our state of the art. European Polymer Congress (EPF) 2019. Heraklion, Crete (Greece), 9-14 June, 2019. BIO-C03, page 209 in the book of Abstract.

S. Catena, F. Turrini, P. Zunin, D. Donno, G. Beccaro, M. Guido and R. Boggia. Valorization of by-products from *Ribes nigrum* bud-derivative food supplements: Pulsed Ultrasound-Assisted Extraction vs a second maceration. Summer School “Valorization of by-products from agri-food supply chains for the development of functional ingredients, foods and nutraceuticals”, San Floriano, Verona, 24 June-26 June, 2019. Abstract 4 in the book of Abstract.

S. Catena, S. Sanllorente, L.A. Sarabia, R. Boggia, P. Zunin and M.C. Ortiz. Advantages of using PARAFAC in the unequivocal identification and quantification of ternary mixtures' polycyclic aromatic hydrocarbons by fluorescence spectroscopy. XXII Reunión de la Sociedad Española de Química Analítica (SEQA 2019). University of Valladolid (Spain), 17-19 July 2019. FyO-F02, page 98 in the Book of Abstract.

Poster communications at Conferences

F. Turrini, P. Zunin, E. Castelli, F. Marsano, C. Villa, S. Catena, S. Alfei, M.G. Signorello, S. La Maestra, R. Boggia. Microonde ed ultrasuoni: tecnologie green per lo sfruttamento e la valorizzazione degli scarti di produzione del succo di melograno. Prima giornata di studio “sostenibilità e processi chimici microonde mediate”. Genova, October 19, 2018.

S. Catena, F. Turrini, R. Boggia, M. Borriello, M. Gardella and P. Zunin. Effects of different cooking conditions on the antioxidant content of a violet rice (*Oryza Sativa* L. 'Violet Nori'). Italian Food Chemistry Congress (CHIMALI – XII). Camerino, September 24-27, 2018. P.22, page 103 in the Book of Abstract.

F. Turrini, D. Donno, G. Beccaro, P. Zunin, S. Catena and R. Boggia. Castanea sativa bud-derivative: an innovative green extraction and re-use strategy to valorize food supplement by-products. *Italian Food Chemistry Congress (CHIMALI – XII)*. Camerino, September 24-27, 2018. P.104, page 192 in the Book of Abstract.

S. Alfei, A. Spallarossa and S. Catena Characterization of water soluble dendrimer formulations of an insoluble thiocarbamate derivative with moderate anti HIV-1 activity: an overview. *XXXVIII Convegno Nazionale della Divisione di Chimica Organica (CDCO_2018)*. Milano, September 9-13, 2018. P. 36, page 103 in the Book of Abstract.

S. Alfei, A. Spallarossa and S. Catena. Hydrophilic and amphiphilic water-soluble dendrimer formulations of a not-soluble thiocarbamate derivative with moderate anti HIV activity for biomedical applications. *XXXVIII Convegno Nazionale della Divisione di Chimica Organica (CDCO_2018)*. Milano, September 9-13, 2018. P. 36, page 103 in the Book of Abstract.

S. Alfei, R. Boggia, B. Parodi, F. Turrini, P. Zunin and S. Catena. Amazing increase of Ellagic Acid solubility by its entrapping into not PAMAM-structured biocompatible dendrimer scaffolds. *Spanish-Italian Symposium on Organic Chemistry (SISOC-XII)*. Ferrara, July 2-4, 2018. P.36, page 103 in the Book of Abstract. 2) F. Turrini, P. Zunin, E. Castelli, F. Marsano, C. Villa, S. Catena, S. Alfei, M.G. Signorello, S. La Maestra, R. Boggia. Microonde ed ultrasuoni: tecnologie green per lo sfruttamento e la valorizzazione degli scarti di produzione del succo di melograno. Prima giornata di studio "sostenibilità e processi chimici microonde mediate". Genova, 19 October, 2018.

S. Alfei, S. Catena and F. Turrini. By connecting a synthetic scaffold and a natural shell of Gallic acid, an innovative double-acting antioxidant device to fight « oxidative stress ». IV China-Italy Symposium Organic Chemistry (IV CISOC). Bologna, 16-17 April, 2019. PC1, page 79 in the book of Abstract.

S. Alfei, A. Spallarossa, S. Catena, F. Turrini, G. Zuccari, A. Pittaluga and R. Boggia. Characterization data of water-soluble hydrophilic and amphiphilic dendrimers prodrugs for delivering bioactive chemical entities otherwise non soluble. European Polymer Congress (EPF) 2019. Heraklion, Crete (Greece), 9-14 June, 2019. BIO-P086, page 683 in the book of Abstract.

S. Catena, F. Turrini, P. Zunin, D. Donno, G. Beccaro, M. Guido and R. Boggia. Valorization of by-products from *Ribes nigrum* bud-derivative food supplements: Pulsed Ultrasound-Assisted Extraction vs a second maceration. Summer School "Valorization of by-products from agri-food supply chains for the development of functional ingredients, foods and nutraceuticals", San Floriano, Verona, 24-26 June, 2019. Abstract 4 in the book of Abstract.

S. Catena, S. Sanllorente, L.A. Sarabia, R. Boggia, P. Zunin and M.C. Ortiz.
Advantages of using PARAFAC in the unequivocal identification and quantification
of ternary mixtures' polycyclic aromatic hydrocarbons by fluorescence spectroscopy.
XXII Reunión de la Sociedad Española de Química Analítica (SEQA 2019).
University of Valladolid (Spain), 17-19 July 2019. FyO-F02, page 98 in the Book of
Abstract.

Signature

A handwritten signature in cursive script, reading "Silvia Catena". The signature is written in black ink on a white background.