Roberto Chignola

Department of Biotechnology
University of Verona
Strada Le Grazie 15 – CV1
I – 37134, Verona (Italy)

Phone: (+39) 045-8027953
Fax: (+39) 045-8027929
Email: roberto.chignola@univr.it
Homepage: link

Personal informations

Birthdate: March 27th, 1966
Birthplace: Verona, Italy

Present position

Associate Professor (as of Dec. 28, 2018)
Area: 09 – Industrial and Information Engineering
Sector: 09/IBIO-01 – Bioengineering
Sub-sector: IBIO-01/A – Bioengineering
Department of Biotecnology, University of Verona

Education

- 1984: High school diploma
- 1989: Degree (Laurea) In Biology, University of Padova. Thesis title: *Application of flow cytometry to study the endocytosis of proteinaceous toxin vectors: correlation between endocytosis and cytotoxicity* (thesis advisor Prof. Cesare Montecucco)
- 1991: National qualification as professional biologist

Teaching qualification

- 2017: Habilitation in Applied Physics
- 2017: Habilitation in Bioengineering

Research interests

- Experimental and theoretical oncology
- Experimental and theoretical immunology
- Toxicity analysis of food components and of drugs
- Applied statistics
- Modeling of biological systems

Short description

I started my scientific career at the Immunology Institute of the University of Verona where I prepared my thesis work (that I discussed at the University of Padova). I worked in the field of ligand/toxin conjugates as experimental anti-tumor therapeutics and I was asked to study their intracellular trafficking and their cytotoxic effects on tumor cells grown in three-dimensional cell culture systems (tumor spheroids). At that time I could learn the basics of biochemical, molecular biology and cell culture techniques, and I became skilled in the cytotoxicity testing of drugs and in the production of monoclonal antibodies.

Stimulated by continuous discussions with colleagues, however, I started studying the immunopathology of tumors and of autoimmune diseases. I then used my acquired skills on the cytotoxicity testing of drugs and my knowledge of immunology to cooperate with food scientists in topics such as the toxicity of food components on the immune system at the gastro-intestinal interface.

Since the very beginning of my research activity, I thought that a quantitative approach could have helped us improving our knowledge of complex diseases such as cancer. I therefore attended biophysical courses and I started to work with experts from different disciplines such as Physics, Mathematics, Engineering. I succeeded in modeling the intracellular trafficking of toxins (first half of the '90s). Then I focused my research on the mathematical modeling of tumor growth, keeping in mind that the mathematical/physical modeling of biological processes must always proceed in parallel with experimentation. This approach has permeated all my research activity, up to recent times where my research is mainly devoted to the bottom-up numerical modeling of solid cancers.

Thus, during the course of my studies I have acquired new skills. I can now translate model equations into laboratory experiments and vice versa, and use basic and advanced statistical methods to analyse data and grasp biological information.

Post-lauream training courses

- 1989: International course on *Molecular mechanisms of intracellular targeting and sorting*, University of Trieste and University of Udine in collaboration with the Biophysics and Molecular Biology Society
- 1990: First national course on *Tumor immunology*, University of Verona
- 1997: International course on *Chaos and noise in biology and medicine*, Italian Institute of Philosophy Studies and International School of Biophysics, Ischia (Napoli)
- 1997: National course on *Complex systems in biology*, School of Pure and Applied Biophysics, Venezia
- 2008: National course on *From genes to models and return*, PhD School in Molecular and Biological Sciences, University of Milano

Profession

- 1990 – 1992: Three-years fellowship from the Italian Association for Cancer Research (AIRC). Project title: *Production of chimeric toxins with improved trans-membrane translocation properties for the synthesis of anti-tumor ligand/antibody toxin conjugates*
- 1993: International Cancer Technology Transfer grant from the National Cancer Institute (NCI, USA) and the Union Internationale Contre le Cancer (UICC, Switzerland).

Project title: *Immunotoxins in cancer treatment: improvement of pharmacologic potential*. Supervisor: Dr. Richard J. Youle. Place: National Institutes of Health (Bethesda, USA)

- 1993 – 1994: Fellowship from the Italian Ministry of Health. Project title: *Production of a chimeric gp41/Ricin A chain toxin*
- 1994 – 1996: Fellowship from the local health units ULSS25 followed by a contract with the University of Verona. Project title: *Study on the chemico-physical and biological properties of cytotoxic molecules for the production of novel anti-tumor molecules*
- 1996 – 2002: Permanent position as Laboratory Technician, Immunology Institute, University of Verona
- 2000 and 2001: Visiting fellow at the Instituto Gulbenkian de Ciência, Lisboa, Portugal
- 2000 – 2001: Research contract with the National Research Council. Project title: *Organized fluctuations in complex biological systems*. Place: Institute of Electronic Circuits, Genova
- 2002 – 2014: Associate fellow at the National Institute for Nuclear Physics
- 2002 – 2018: (Dec. 30, 2002 – Dec. 28, 2018) Assistant Professor, Area 06/A2 – General and Clinical Pathology, Sector MED/04 – General Pathology, Depatment of Biotechnology, University of Verona

Responsibilities

- 2002 – now: I lead the Experimental and Theoretical Immunology and Oncology Lab (launched in 2002 with grants from Fondazione Cariverona) at the Department of Biotechnology
- 2002 – 2012: I am the co-investigator of several initiatives in the field of biophysics of cancer (Virtus, VBL, VBL-Rad and now eBON, with grants from the Commission V, INFN)
- 2002 – 2004: Research unit leader, project *Physiopathological aspects of the interactions between cereal-based foodstuffs and the immune system*, granted by the Fondazione Cariverona
- 2002 – 2005: Research unit leader, project title *Food quality and health*, FISR, sponsored by four Governmental Ministries
- 2005: Member of the scientific commitee, National Meeting *BIOSYS 2005*, National Association for Automation
- 2005 – 2015: Member of the teaching/tutoring staff, PhD in Applied Biotechnology, PhD School in Sciences, Engineering and Medicine
- 2006 – 2009: I actively participated in the project *Scientific Degrees* (Lauree Scientifiche) sponsored by the Ministry of Instruction, University and Research. I organized lessons and practical short courses of applied mathematics for high-school students
- 2007 – 2010: Research unit leader, project *Development of models to assess the risks*

deriving from the addition of enzymes to cereal flours on human health, granted by the Fondazione Cariverona

- 2010: Co-investigator of an HPC (High Performance Computing) project related to VBL/eBON at CINECA (C type grant)
- 2010: Co-investigator of an HPC project related to VBL at CASPUR (standard HPC grant)
- 2010: Co-investigator, project title *New technologies for the "made in Italy"*, Ministry of Economic Development (36 months)
- 2011: Co-investigator of an HPC project related to eBON at CASPUR (standard HPC grant)
- 2011: Local coordinator of the two years PRIN (Projects of Relevant National Interest) project *Numerical simulation of tumor spheroids*
- 2011: Co-investigator of a two years Joint Project (University/Industry). Project title *Strategies for the development of new vaccines for wheat allergy*
- 2014: Local coordinator, project title *MERIDIAN* (Measuring the Effects of Radiation on Immunity and DIfferentiAtioN), Commission V, INFN
- 2017 – 2019: Principal investigator, project title *Slowing down the aggressiveness of solid tumors*, Basic Research Program, University of Verona
- 2023 – 2025: Supervisor of the research project entitled *Signal analysis and development of models for production forecasting in the agri-food field (smart agri-food)*, Interconnected Nord-Est Innovation Ecosystem (iNEST), National Plan PNRR funded by the European Union, NextGeneration EU: ECS00000043
- 2025 – 2027: Co-investigator, project title *Research and Innovation for Active Aging: A New Challenge for Research Organizations and Companies Allied in Actions for Aging (RIxAA)*. Research and development projects funded by the Regional Innovation Networks and Industrial Districts, Veneto Regional Development Fund (PR) FESR 2021-2027, Action 1.1.1 "Strengthening Research and Innovation (in Collaboration) between Companies and Research Organizations." Scientific Director: Prof. Gerolamo Lanfranchi. Task 8.3.

Institutional responsibilities

- 2003 – 2004: Member of the board of experts for the development of a new specialistic academic course on Molecular and Industrial Biotechnology, University of Verona
- 2004 – 2010: Member of the Student File Commission, bachelor's and master degree courses in Biotechnology, University of Verona
- 2005 – 2015: Member of the Teaching Staff Council, PhD in Applied Biotechnologies, PhD School in Science, Engineering and Medicine, University of Verona
- 2005 – 2009: Member of the Biotechnology Department Board, University of Verona
- 2010: Member of the Inter-dipartmental Center of Experimental Research Service, as the representative of the Department of Biotechnology

- 2017: Member of the committee for the development of a scientific and didactic departmental project, national competition “Dipartimenti di Eccellenza" (Department of Excellence) sponsored by the Italian Ministry of Education, University and Research (positive evaluation)
- 2017 – 2018: Member of the board of experts for the development of a new master degree course on Industrial Biotechnology, University of Verona (activated in 2019)
- 2017 – now: Member of the emergency unit of the Department of Biotechnology, University of Verona (BLSD, fire hazard and rescue certifications)
- 2019 – 2021: Member of the Quality Assurance Board of the University of Verona as the representative of the Science and Engineering Macro-area
- 2024 – now: Member of the Biotechnology Department Board, University of Verona
- 2025: Referee and member of the Examination Board for the conferment of Ph.D in Interdisciplinary Physics (IP 2), University of Trieste

Teaching

- 1991 – 1995: General Immunology and Immunohematology (first and second year courses, respectively), Regional High School for Professional Nurses
- 1995 – 1996: Immunohematology, University Diploma in Nursing Sciences, Faculty of Medicine, University of Verona
- 2002 – 2010: Immunology, Biotechnology Degree Course, Faculty of Sciences, University of Verona
- 2003 – 2010: Techniques of Animal Cell Cultures, Biotechnology Degree Course, Faculty of Sciences, University of Verona
- 2008 – 2010: Introduction to Pathology and Oncology, Master Degree in Molecular and Industrial Biotechnology, University of Verona
- 2012 – 2013: Introduction to Pathology and Immunology, Biotechnology Degree Course, University of Verona
- 2005 – 2015: advanced courses in Experimental and Theoretical Oncology, Applied Statistics, PhD Program in Applied Biotechnology, PhD School in Sciences, Engineering and Medicine, University of Verona
- 2015 – 2023: Statistics, Biotechnology Degree Course, University of Verona
- 2017 – 2024: Mathematical models in biology/Mathematical and statistical methods in biology, Applied Mathematics Degree Course, University of Verona
- 2019 – now: Quantitative methods for Biotechnology, Master Degree in Biotechnology for bioresources and sustainable development, University of Verona
- 2023 – now: Mathematics and Statistics, Biotechnology Degree Course, University of Verona
- 2025 – now: Elements of Mathematics for Physics, Biotechnology Degree Course, University of Verona

- 2002 – now: Advisor (with full responsibility) of numerous thesis works (>35), Degree Courses in Biotechnology

Invited talks at National and International Meetings

- 1990: *DNA analysis by flow cytometry*, National meeting on Actualities on Colon-Rectum Carcinoma, University of Pisa, Pisa (Italy)
- 1998: *Mathematical approaches to complex systems*, National meeting of the Italian Neuroimmunology Association, Chieti (Italy)
- 2001: *Order and disorder in natural systems*, National meeting on Mathematics and Neurosciences (Neuromat-II), Pavia (Italy)
- 2002: *Mathematical modeling of multicellular tumor spheroid growth: implications for the growth of solid tumors*, International meeting on Advances in the use of multicellular spheroids in cancer biology and therapy, ISS, Rome (Italy)
- 2002: *Toxicological aspects and problems of foodstuffs from genetically modified organisms*, National meeting on Foodstuffs and GMO, Verona (Italy)
- 2006: *Metabolism and cell population dynamics*, Gordon Research Conference on Metabolism and Ecology, Bates College, Portland, Maine (USA)
- 2006: *Virtual Biophysics Lab*, National meeting on Applications of physics to biology and medicine, INFN and University of Trieste, Trieste (Italy)
- 2008: *Ab initio computational modeling of tumor spheroids*, 1st Transatlantic Workshop on multilevel cancer modeling, Bruxelles (Belgium)
- 2013: *From tumor microenvironment dynamics to scaling-laws in oncology*, XCIX National meeting of the Italian Physics Society, Trieste (Italy)

Science communication

Public conferences

- 2009: *On the origins of tumors: when a cell loses control*, High School E. Medi, Villafranca (Verona, Italy)
- 2010: *The immune system: how we defend ourselves against the attack of evolving pathogens*, High School E. Medi, Villafranca (Verona, Italy)
- 2011: *On the origin of tumors: the basis for a personalized therapy*, civic center, San Pietro di Lavagno (Verona, Italy)
- 2019: *Mathematics and Tumors*, R. Chignola and L. Corso, Accademia di Agricoltura Scienze e Lettere (Verona, Italy). Teacher training day.

Scientific Degrees Plan (PLS)

PLS is an initiative of the Italian Ministry of Education, University and Research, of the National Conference of Science and Technology Faculty Chairs and of the General Confederation of Italian Industry

(website: `https://www.pianolaureescientifiche.it/pianolaureescientifiche/`)

- 2006: *Mathematics in oncology: growth kinetics of solid tumors*, laboratory of biomathematics for secondary school students. The project was developed and carried out in collaboration with professors from the secondary school Istituto Tecnico Industriale Statale G. Marconi (Verona, Italy)
- 2007: *Mathematics and tumor radiotherapy*, laboratory of biomathematics for secondary school students. The project was developed and carried out in collaboration with teachers from the secondary school Istituto Tecnico Industriale Statale G. Marconi (Verona, Italy)
- 2009: *Prey-predator dynamics: computer simulations*, laboratory of biomathematics for secondary school students. The project was developed and carried out in collaboration with professors from the secondary school Istituto Tecnico Industriale Statale G. Marconi (Verona, Italy)
- 2019: *Mathematics and Tumors*, R. Chignola and L. Corso, Accademia di Agricoltura Scienze e Lettere (Verona, Italy). Teacher training day
- 2021: *How tall can be a tree? Allometries and scaling laws in biology*, R. Chignola (seminar online). Secondary school teachers training day

Scientific societies

- 1997 – 2001: Member of the Society for Mathematical Biology
- 2015 – 2025: Member of the Italian Society of Cancerology and of the European Association for Cancer Research
- since 2019: National Bioengineering Group

Awards

- 2006: Award from the National Association for Automation

Patents

- Highly efficient method used for the screening of bioactive molecules. R. Chignola, C. Dalla Pellegrina, C. Tomelleri. University of Verona, Patent number: IT1380835-B (Sep. 13, 2010)
- Multi-layered paticles. F. Zanoni, G. Zoccatelli, M. Vakarelova, R. Chignola. US Provisional Patent Application 62/769,642; Patent 067641-P0001A RDG (2018)

Publications

(most recent items come first)

Refereed papers in scientific journals

1. R. Chignola. Energy consumption and biophysical response of 3D tumor cell cultures of human breast carcinoma cells (T47D) subjected to mechanical stress. *Biophysics Reviews* (2026), 7: 011402

2. D. Fortini, R. Chignola, G. Zanni, A. Brunazzi, A. Zamboni, G. Zoccatelli, M. Ciulu, D.V. Santisteban Soto, T. Sanson, T. Pandolfini, B. Molesini. Multi-level approach to screen tomato inbred lines for resilience to Ni-enriched soils and water deficit. *Plant Stress* (2025), 15: 100794

3. I. Fierri, R. Chignola, C. Stranieri, E.G. di Leo, M. Bellumori, S. Roncoletta, A. Romeo, F. Benetti, A.M. Fratta Pasini, G. Zoccatelli. Formulation, characterization and antioxidant properties of chitosan nanoparticles containing phenolic compounds from olive pomace. *Antioxidants* (2024), 13: 1522

4. S. Gambino, F.M. Quaglia, M. Galasso, C. Cavallini, R. Chignola, O. Lovato, L. Giacobazzi, S. Caligola, A. Adamo, S. Putta, A. Aparo, I. Ferrarini, S. Ugel, R. Giugno, M. Donadelli, I. Dando, M. Krampera, C. Visco, M.T. Scupoli. B-cell receptor signaling activity identifies patients with mantle cell lymphoma at higher risk of progression. *Scientific Reports* (2024), 14: 6595

5. M. Formentin, R. Chignola, M. Favretti. Optimal entropic properties of SARS-CoV-2 RNA sequences. *Royal Society Open Science* (2024), 11: 231369

6. A. Mara, M. Migliorini, M. Ciulu, R. Chignola, C.E. Perianes, O. Nuñez, S. Sentellas, J. Saurina, M. Caredda, M.A. Deroma, S. Deidda, I. Lagnasco, M.I. Pilo, N. Spano, G. Sanna. Elemental fingerprinting combined with machine learning techniques as a powerful tool to geographical honey discrimination. *Foods* (2024), 13: 243

7. L. De Marchi, L. Salemi, M. Bellumori, R. Chignola, F. Mainente, D.V. Santisteban Soto, I. Fierri, M. Ciulu., G. Zoccatelli. Thermal degradation of red cabbage (*Brassica oleracea* L. var. Capitata f. rubra) anthocyanins in a water model extract under accelerated shelf-life testing. *Food Chemistry* (2024), 440: 138272

8. M. Migliorini, I. Fierri, G. Zoccatelli, R. Chignola. *Chemdeg*, an R package for the analysis of foods isothermal degradation kinetics. *Journal of Food Engineering* (2024), 363: 111778

9. I. Fierri, L. De Marchi, R. Chignola, G. Rossin, M. Bellumori, A. Perbellini, I. Mancini, A. Romeo, G. Ischia, A. Saorin, F. Mainente, G. Zoccatelli. Naoencapsulation of anthocyanins from red cabbage (*Brassica oleracea* L. var. *Capitata f. rubra*) through coacervation of whey protein isolate and apple high methoxyl pectin. *Antioxidants* (2023), 12: 1757

10. G. Gonzato, E. Borghi, R. Chignola, N. Preto, G. Rossi. Paleokarst coastal caves at Torricelle Hills (Lessini Mountains, Venetian Prealps, Italy). *International Journal of Speleology* (2023), 52: 123-138

11. M. Vakarelova, F. Zanoni, G. Donà, I. Fierri, R. Chignola, S. Gorrieri, G. Zoccatelli. Microencapsulation of astaxanthin by ionic gelation: effect of different gelling polymers on the carotenoid load, stability and bioaccessibility. *International Journal of Food Science and Technology* (2023), 58: 2489-2497

12. M. Galasso, E. Dalla Pozza, R. Chignola, S. Gambino, C. Cavallini, F.M. Quaglia, O. Lovato, I. Dando, G. Malpeli, M. Krampera, M. Donadelli, M.G. Romanelli, M.T. Scupoli. The rs1001179 SNP and CpG methylation regulate catalase expression in chronic lymphocytic leukemia. *Cellular and Molecular Life Sciences* (2022), 79: 521

13. F. Mainente, A. Piovan, F. Zanoni, R. Chignola, S. Cerantola, S. Faggin, M.C. Giron, R. Filippi, R. Seraglia, G. Zoccatelli. Spray-drying microencapsulation of an extract from *Tilia tomentosa* moench flowers: physicochemical characterization and *in vitro* intestinal activity. *Plant Foods for Human Nutrition* (2022), doi: 10.1007/s11130-022-00995-y

14. R. Chignola, F. Mainente, G. Zoccatelli. Rheology of individual chitosan and polyphenol/chitosan microparticles for food engineering. *Food Hydrocolloids* (2022), 132: 107869

15. O. Perbellini, C. Cavallini, R. Chignola, M. Galasso, M.T. Scupoli. Phospho-specific flow cytometry reveals signaling heterogeneity in T-cell acute lymphoblastic leukemia cell lines. *Cells* (2022), 11: 2072

16. G. Albi, R. Chignola, F. Ferrarese. Efficient ensemble stochastic algorithms for agent-based models with spatial predator-prey dynamics. *Mathematics and Computers in Simulation* (2022), 199: 317-340

17. E. Binatti, G. Zoccatelli, F. Zanoni, G. Donà, F. Mainente, R. Chignola. Effects of Combination Treatments with Astaxanthin-Loaded Microparticles and Pentoxifylline on Intracellular ROS and Radiosensitivity of J774A.1 Macrophages. *Molecules* (2021), 26: 5152

18. G. Baggio, R.A. Groves, R. Chignola, E. Piacenza, A. Presentato, I.A. Lewis, S. Lampis, G. Vallini, R.J.Turner. Untargeted Metabolomics Investigation On Selenite Reduction To Elemental Selenium By Bacillus mycoides SeITE01. *Frontiers in Microbiology* (2021), 12: 711000

19. E. Binatti, G. Zoccatelli, F. Zanoni, G. Donà, F. Mainente, R. Chignola. Phagocytosis of astaxanthin loaded microparticles modulates TGFβ production and intracellular ROS levels in J774A.1 macrophages. *Marine Drugs* (2021), 19, 163

20. C. Cavallini, M. Galasso, E. Dalla Pozza, R. Chignola, O. Lovato, I. Dando, M.G. Romanelli, M. Krampera, G. Pizzolo, M. Donadelli, M.T. Scupoli. Effects of CD20 antibodies and kinase inhibitors on BCR signalling and survival of CLL cells. *British Journal of Haematology* (2021), 192: 333-342

21. N. Piasentin, E. Milotti, R. Chignola. The control of acidity in tumor cells: a biophysical model. *Scientific Reports* (2020), 10: 13613

22. S. Patmanidis, R. Chignola, A. C. Charalampidis, G. P. Papavassilopolous. A comparison between nonlinear least squares and maximum likelihood estimation for the prediction of tumor growth on experimental data of human and rat origin. *Biomedical Signal Processing and Control* (2019), 54: 101639

23. T. Fredrich, H. Rieger, R. Chignola, E. Milotti. Fine-grained simulations of the microenvironment of vascularized tumours. *Scientific Reports* (2019), 9: 11698

24. L. Andolfi, S.L.M. Greco, D. Tierno, R. Chignola, M. Martinelli, E. Giolo, S. Luppi, I. Delfino, M. Zanetti, A. Battistella, G. Baldini, G. Ricci, M. Lazzarino. Planar AFM macro-probes to study the biomechanical properties of large cells and 3D spheroids. *Acta Biomaterialia* (2019), 94: 505-513

25. G. Badino, R. Chignola. Fluctuations of atmospheric pressure and the sound of underground karst systems: the Antro del Corchia case (Apuane Alps, Italy). *Frontiers in Earth Science* (2019), 7: 147

26. R. Chignola, M. Sega, B. Molesini, A. Baruzzi, S. Stella, E. Milotti. Collective radioresistance of T47D breast carcnoma cells is mediated by a Syncytin-1 homologous protein. *PLoS ONE* (2019), 14: e0206713

27. S. Stella, R. Chignola, E. Milotti. Dynamical detection of boundaries and cavities in biophysical cell-based simulations of growing tumour tissues. *IEEE/ACM Transactions on Computational Biology and Bioinformatics* (2019), 16: 1901-1911

28. C. Cavallini, R. Chignola, I. Dando, O. Perbellini, E. Mimiola, O. Lovato, C. Laudanna, G. Pizzolo, M. Donadelli, M.T. Scupoli. Low catalase expression confers redox hypersensitivity and identifies an indolent clinical behavior in CLL. *Blood* (2018), 131: 1942-1954

29. A. Menin, F. Zanoni, M. Vakarelova, R. Chignola, G. Donà, C. Rizzi, F. Mainente, G. Zoccatelli. Effects of microencapsulation by ionic gelation on the oxidative stability of flaxseed oil. *Food Chemistry* (2018), 269: 293-299

30. B. Molesini, G.L. Rotino, V. Dusi, R. Chignola, T. Sala, G. Mennella, G. Francese, T. Pandolfini. Two metallocarboxypeptidase inhibitors are implicated in tomato fruit development and regulated by the Inner No Outer transcription factor. *Plant Science* (2018), 266: 19-26

31. E. Milotti, V. Vyshemirsky, S. Stella, F. Dogo, R. Chignola. Analysis of the fluctuations of the tumor/host interface. *Physica A* (2017), 486: 587-594

32. G. Gonzato, G. Rossi, R. Chignola. Basalt intrusions in palaeokarst caves in the central Lessini Mountains (Venetian Prealps, Italy). *Acta Carsologica* (2017), 46: 33-45

33. E. Milotti, S. Stella, R. Chignola. Pulsation-limited oxygen diffusion in the tumour microenvironment. *Scientific Reports* (2017), 7: 39762

34. D. Treggiari, G. Zoccatelli, R. Chignola, B. Molesini, P. Minuz, T. Pandolfini. Tomato cystine-knot miniproteins possessing anti-angiogenic activity exhibit in vitro gastrointestinal stability, intestinal absorption and resistance to food industrial processing. *Food Chemistry* (2017), 221: 1346-1353

35. M. Vakarelova, F. Zanoni, P. Lardo, G. Rossin, F. Mainente, R Chignola, A. Menin, C. Rizzi, G. Zoccatelli. Production of stable food-grade microencapsulated astaxanthin by vibrating nozzle technology. *Food Chemistry* (2017), 221: 289-295

36. S. P. Santero, F. Favretto, S. Zanzoni, R. Chignola, M. Assfalg, M. P. D'Onofrio. Effects of macromolecular crowding on a small lipid binding protein probed at the single-aminoacid level. *Archives of Biochemistry and Biophysics* (2016), 606: 99-110

37. F. Mainente, C. Rizzi, G. Zoccatelli, R. Chignola, B. Simonato, G. Pasini. Setup of a procedure for cider proteins recovery and quantification. *European Food Research and Technology* (2016), 242: 1803-1811

38. V. Guglielmi, G. Vattemi, R. Chignola, A. Chiarini, M. Marini, I. Dal Pra, M. Di Chio, C. Chiamulera, U. Armato, G. Tomelleri. Evidence for caspase-dependent programmed cell death along with repair processes in affected skeletal muscle in patients with mitochondrial disorders. *Clinical Science* (2016), 130: 167-181

39. A. Baruzzi, S. Remelli, E. Lorenzetto, M. Sega, R. Chignola, G. Berton. Sos1 regulates macrophage podosome assembly and macrophage invasive capacity. *The Journal of Immunology* (2015), 195: 4900-4912

40. C. Lombardo, M. Bolla, R. Chignola, G. Senna, G. Rossin, B. Caruso, C. Tomelleri, D. Cecconi, A. Brandolini, G. Zoccatelli. A study of the immunoreactivity of *T. monococcum* (Einkorn) wheat in patients with wheat-dependent exercise-induced anaphylaxis for he production of hypoallergenic foods. *Journal of Agricultural and Food Chemistry* (2015), 63: 8299-8306

41. R. Chignola, M. Sega, S. Stella, V. Vyshemirsky, E. Milotti. From single-cell dynamics to scaling laws in oncology. *Biophysical Reviews and Letters* (2014), 9: 273-284

42. M. Sega, R. Chignola. Population ecology of heterotypic tumour cell cultures. *Cell Proliferation* (2014), 47: 476-483

43. G. Gonzato, A. Castellarin, R. Chignola, F. Gamberini, P. Lazzeri, Unione Speleologica Veronese. New dating of paleokarst features at Torricelle hills (Verona, Italy). *Italian Journal of Geosciences* (2014), 133: 427-438

44. S. Stella, R. Chignola, E. Milotti. Efficient and extendible class scheme for the combined reaction-diffusion of multiple molecular species. *Computer Physics Communications* (2014), 185: 826-835

45. E. Milotti, V. Vyshemirsky, M. Sega, S. Stella, R. Chignola. Metabolic scaling in solid tumours. *Scientific Reports* (2013), 3: 1938

46. E. Milotti, V. Vyshemirsky, M. Sega, S. Stella, F. Dogo, R. Chignola. Computer-aided biophysical modeling: a quantitative approach to complex biological systems. *IEEE/ACM Transactions on Computational Biology and Bioinformatics* (2013),10: 805-810

47. A. Cesano, O. Perbellini, E. Evensen, C.C. Chu, F. Cioffi, J. Ptacek, R.N. Damle, R. Chignola, J. Cordeiro, X. Yan, R.E. Hawtin, I. Nichele, J.R. Ware, C. Cavallini, O. Lovato, R. Zanotti, K.R. Rai, N. Chiorazzi, G. Pizzolo, M.T. Scupoli. Association between B-cell receptor responsiveness and disease progression in B-cell chronic lymphocytic leukemia: results from single cell network profiling studies. *Haematologica* (2013), 98: 626-634

48. E. Milotti, V. Vyshemirsky, M. Sega, R. Chignola. Interplay between distribution of live cells and growth dynamics of solid tumours. *Scientific Reports* (2012), 2: 990

49. G. Zoccatelli, M. Sega, M. Bolla, D. Cecconi, P. Vaccino, C. Rizzi, R. Chignola, A. Brandolini. Expression of α-amylase inhibitors in diploid *Triticum* species. *Food Chemistry* (2012), 135: 2643-2649

50. M. Sega, C. Zanetti, C. Rizzi, M. Olivieri, R. Chignola, G. Zoccatelli. Production and characterization of monoclonal antibodies for the quantification of potentially allergenic xylanases from *Aspergillus niger*. *Food Additives and Contaminants. Part A. Chemistry, Analysis, Control, Exposure & Risk Assessment* (2012), 29: 1356-1363

51. R. Chignola. La distribuzione di Poisson nel laboratorio biomedico. *MatematicaMente* (2012), 168

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Abstracts and talks: National Meetings

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2. F.M. Quaglia, S. Gambino, M. Galasso, C. Cavallini, R. Chignola, L. Giacobazzi, S. Caligola, A. Adamo, D. Putta, I. Ferrarini, S. Ugel, M. Donadelli, I. Dando, M. Krampera, M.T. Scupoli, C. Visco. *B-cell receptor signalling activity identifies patients with mantle cell lymphoma at higher risk of progression*, 50° Congresso Nazionale della Società Italiana di Ematologia, Roma (2023)

3. C. Cavallini, R. Chignola, I. Dando, O. Perbellini, E. Mimiola, O. Lovato, M. Donadelli, M.T. Scupoli. *Phospho-specific flow cytometry for characterizing redox signaling sensitivity associated with leukemia disease progression*, 2nd Meeting of the Italian Society for Clinical Cell Analysis, Bologna (2017)

4. C. Cavalini, O. Perbellini, R. Chignola, I. Dando, E. Zoratti, E. Mimiola, M. Donadelli, C. Laudanna, G. Pizzolo, M.T. Scupoli. *Redox signaling hypersensitivity is associated with favorable prognosis in chronic lymphocytic leukemia patients*, 46° Congresso Nazionale della Società Italiana di Ematologia, Roma (2017)

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6. S. Stella, R. Chignola, E. Milotti. *Accelerating biophysics simulations with Graphics Processing Units*, 102° Congresso Nazionale della Società Italiana di Fisica, Padova (2016)

7. R. Chignola, P. Donato, R. Massa, E. Milotti. *Microwave spectroscopy for biomarkers detection*, V Congresso del Gruppo Nazionale di Bioingegneria, Napoli (2016)

8. R. Chignola, M. Sega, A. Baruzzi, S. Stella, E. Milotti. *Resistance of T47D human breast carcinoma cells to ionizing radiations*, 58th Annual Meeting of the Italian Cancer Society, Verona (2016)

9. C. Cavallini, O. Perbellini, R. Chignola, I. Dando, E. Zoratti, E. Mimiola, M. Donadelli, C. Laudanna, G. Pizzolo, M.T. Scupoli. *Association of reactive oxygen species-mediated signal transduction with favourable prognosis in chronic lymphocytic leukemia patients*, 58th Annual Meeting of the Italian Cancer Society, Verona (2016)

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11. M. Sega, R. Chignola. *Radioresistance of breast cancer T47D cells grown as 3D cultures*, 27th Annual Conference of Italian Association of Cell Cultures (ONLUS-AICC), Verona (2014)

12. C. Giulia, M. Sega, A. Carcereri de Prati, E. Butturini, R. Chignola, S. Mariotto. *Chemosensitization of breast cancer cells to chemotherapy through HIF-1alpha inhibition in hypoxic environment: preliminary studies*, 27th Annual Conference of Italian Association of Cell Cultures (ONLUS-AICC), Verona (2014)

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