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Alberto d'Onofrio

CURRICULUM VITAE

INFORMAZIONI PERSONALI (NON INSERIRE INDIRIZZO PRIVATO E TELEFONO FISSO O CELLULARE)

COGNOME	D'ONOFRIO
NOME	ALBERTO
DATA DI NASCITA	20 MAGGIO 1967

INSERIRE IL PROPRIO CURRICULUM (non eccedente le 30 pagine)

1. Qualifications and diplomas

PhD and Other qualifications, diplomas and/or main training courses

FEB/2021 Enrolled in the « Habilitation à Diriger des Recherches » at Sorbonne University in Paris. I am currently writing my thesis (HDR thesis consists in writing a short book reviewing personal research).

National Scientific Habilitation as Associate Professor in Italian Universities Discipline: Mathematical Physics (01/A4) Year awarded: DEC/2013

National Scientific Habilitation as Associate Professor in Italian Universities Discipline: Bioengineering (09/G2) Year awarded: FEB/2014

PhD in "Informatica Medica" at University of Rome "Sapienza" and IASI CNR. Year awarded: 2000. PhD Advisors: M Rafanelli (CNR) and P Atzeni (Rome 3 University)

Laurea in Ingegneria Elettrotecnica at University of Pisa, Pisa (Italy) Year awarded: 1993

Experience in research positions

Research Director at International Prevention Research Institute, Dardilly (France)
Duties: Research Director in Mathematical Biology From 3 /JAN/2014 to 15/JUN/2020

Visiting Professor (honorary position) at Department of Mathematics and Statistics, Strathclyde University, Glasgow (UK). From 20/APR/2017 to 20/APR/2020

Group leader in Mathematical Biology at Department of Experimental Oncology, Istituto Europeo di Oncologia, Milano (Italy) From 1/JAN/2009 to 31/DEC/2013

External member (honorary position) of the M.I.R.I.A.M. and then A.D.A.M.S.S. Research Center of the Mathematics Department of Milan University. From 2004 to DEC/2013

Researcher: fully autonomous researcher in Mathematical Biology at Department of Experimental Oncology, Istituto Europeo di Oncologia, Milano (Italy). From 1/OCT/2008 to 31/DEC/2008

Researcher: fully autonomous researcher in mathematical biology (90% about), and in epidemiology of cancer (10% about) at Division of Epidemiology and biostatistics, Istituto Europeo di Oncologia, Milano (Italy) From 1/JAN/2004 to 30/SEP/2008

Research Collaborator: fully autonomous researcher in mathematical biology (90% about), and in epidemiology of cancer (10% about) at Division of Epidemiology and biostatistics, Istituto Europeo di Oncologia, Milano (Italy) From 1/JAN/2003 to 31/DEC/2003

Postdoc Research Fellow independent research in mathematical biology (80%); research on epidemiology of cancer in collaboration with the Division Director (20%) at Division of Epidemiology and biostatistics, Istituto Europeo di Oncologia, Milano (Italy) From 1/MAR/2000 to 31/DEC/2002

Career Breaks

<i>Start</i>	<i>End</i>	<i>Reason for interruption</i>
15 JUN 2020	Current	<i>Licenciement économique</i>
17 MAR 2020	17 APR 2020	<i>Chômage Technique</i>
APR 1993	OCT 1995	<i>Civil Service problems and unemployment</i>

2. Metrics

- *Stanford Ranking for Researchers 2020:* Percentile Rank (29/DEC/2020): **1st percentile** (49019 over more than 6 millions) <https://tinyurl.com/1bhz10cl>
- Google Scholar H-Index: **41**
- Google Scholar H10-Index: **87**
- Google Scholar Citations: **5900**

3. Research and Work Outline

Development of my Research Path and Interaction among my research fields. In 1995, after a long period of being workless (delays in Civil service followed by unemployment) I choose to start a non-paid pre-PhD fellowship at CNR because it was focused on the topic of modelling the spread and control of infectious diseases, the so called Mathematical Epidemiology of Infectious Diseases (MEID). This was definitively a winning choice. I had not difficulties in passing from my studies in Electrical Engineering to Biomathematics because the curricula of Electrical Engineering in Pisa University in Eighties were very strongly oriented to mathematics and physics, and in the MSc years I choose the section on Control Theory, the most mathematical of the Engineering School.

My first interest was on the seasonality effects in the diseases transmission rate, which led to my first contribute to a scientific conference (nonlinear parametric resonance) and to my first publication [2000-1]. In meantime, after working some months as Scientific Software Engineer I started in May 1997 an interdisciplinary PhD in *Medical Computer Sciences*. I had also applied to other more mathematical PhDs but I won immediately this and I took it because: 1) the other PhD selections were too late (I should have resigned from this PhD without any guarantee of winning

another PhD position); 2) I was allowed to remain in the same institute and group where I had started my biomathematics pre-PhD; 3) I was guaranteed total independence. This is not surprising because of my long pre-doctoral activities. I must thank of this very rare opportunity my PhD advisor. My thesis was focused mainly on modelling and mathematical analysis of the control of infectious diseases, on fitting epidemic data to infer time-varying transmission rates [2000-1] and in modelling of some data structure of spatiotemporal databases [P1]. The latter was a hot topic because, after the end of iron curtain, that was a period of rapid geo-admin changes. Moreover, a strong background in Computer Sciences helped me along all my career in biomathematics.

During my PhD I had my first **international experience** (DEC 1997 - FEB 2000). Due to my expertise in Databases the design of Graphical User Interfaces, I became junior software consultant at **FAO UN**. My collaboration at FAO UN lasted from December 1997 to February 2000. My consultancy was in the framework of the project *Domestic Animal Diversity Information System (DAD-IS)* (<http://www.fao.org/dad-is/en/>) a pillar FAO project. This allowed me to interact with **scientists and UN officers from all the World**. After my PhD, I started a post-doc fellowship in the *Epidemiology and Biostatistics* division of the most important private research hospital in Italy, the **European Institute of Oncology** www.ieo.it, a world reference center. The motivations of my choice were again related to my strong sense of commitment coming from my personal life. As son of a pancreatic cancer patient, I was strongly interested in Mathematical Oncology (MO). Also this second choice has been a winning one.

The moving to IEO represented even a Thematic Mobility, total from the biological viewpoint **but only partial from the mathematical one**. On the one hand I started working intensely on MO but without abandoning MEID. On the other hand, from **Dynamical Systems Theory** viewpoint, there is a **theoretical connection** between anti-tumor therapies and control of infectious diseases. Indeed, in both cases the number of *non-physiological agents* (tumor cells in oncology and infectious subjects in epidemiology) must be reduced to zero. The most simple *toy meta-model* $\dot{x} = D(t)f(x) - \theta(t)g(x)$ where $D(t)$ and $\theta(t)$ are appropriate diagonal matrices can in an abstract way represent both a cytotoxic+cytostatic therapy and a ‘vaccination + social distancing campaign’. Moreover, both for MO and for MEID, the aim is to characterize the features of the time varying (or time constant) therapy in order that a “**disease free solution**” is **Globally Asymptotically Stable**. The need of globality derives from the fact that in both cases at the best there is a rough estimate of the value of the initial conditions. And in the epidemic case globality is also needed to design a vaccination campaign that is safe against possible large localized outbreaks due to disease importation. Thus, **global stability is one of the main mathematical fils rouges of my career**.

However, another important analogy is of course how the system reacts to a periodic exogenous signal. Classically one would think that for tumors the above mentioned signal is a therapy and that for infectious diseases the periodic signal is the seasonality inherent to the transmission rate (e.g. weather and periodic social phenomena). However, as I discovered by hearing an enlightening talk by Zvia Agur, there was a special vaccination schedule, the *Pulse Vaccination Strategy*, consisting in periodic vaccinations of part of the susceptible population.

Moreover, models of spread of an infectious diseases in a population are formally similar to models of the in-host spread of a virus, and I extended my mathematical results to that field [2005-2].

Years between 2000 and 2013 were an exciting period in Oncology even due to the discoveries of J Folkmann concerning tumor angiogenesis and the possible anti angiogenic therapies, i.e. therapies aimed at the targeted destruction of the vessels that bring nutrients to tumor. The mathematical modelling and analysis of angiogenesis and of anti-angiogenesis therapies has been and is a key part of my work.

A fundamental step in my scientific career was in august 2001 when I was for three week hosted by the then Imperial Cancer Research Found (now Cancer Research UK) where I worked with Ian Tomlinson, world leader in the research on colon crypts. I devised a nonlinear mathematical model of tumorigenesis where this event can be explained by means of a hysteresis bifurcation i.e. setting a link between tumorigenesis in colon crypts and multistability. Since then multistability in biology is a key topic of my research in its various manifestations, among which: the interplay between tumor and immune system and immunoediting.

Investigating tumorigenesis in colon crypts I made my first steps in the stochastic world. I was amazed by the systematic use in mathematical oncology and in theoretical population biology of unbounded perturbations. This observation was the starting point of one of my leading research activities: the theory and applications of bounded stochastic processes.

I quite soon became also interested in microscopic modeling. Again influenced by the Zvia Agur's example, I worked on the mathematical analysis of an essential step of cell biochemical machinery: the cell cycle, whose deregulation is the key ingredient of the tumor onset. I published thus two works on the **uniqueness and global attractiveness** of the chemical machinery underlying the cell cycle [2005-3, 2006-1] and on glycolysis [J2010-8] and related pieces of biochemistry [2011-1]. In this context uniqueness and global attractivity of the biochemical cycles are landmarks of the **robustness of the underlying biological processes**. I extended my interest on sustained oscillations even to mathematical oncology and to epidemiology.

I had a short but I think interesting research experience in the realm of network--based epidemic models [2008-3, 2007-7]. In particular, I **first showed in [2008-3] that the local conditions identified by Vespignani and Pastor-Satorras in the physics literature also determine the global behaviour of a disease spreading on a network**. In [2008-3], I also gave one of the first examples of **multistable network-based epidemic models**.

In January 2014 I moved to France, in Lyon, to work at the 'International Prevention Research Institute', a small but prestigious private research institute founded and directed by Professor Peter Boyle, former general director of WHO IARC. Although I never abandoned MO, I more deeply focused my efforts on modern challenges to MEID.

Since the end of nineties the case of UK Measles vaccine scare, sustained by the Wakefield's infamous retracted Lancet paper, upset the world of global public health: trust in vaccines seemed to be suddenly evaporated. This had an immediate drawback on MEID since classical modeling of vaccination campaigns were less and less realistic. This was the onset of a new branch of biomathematics: the Behavioural Epidemiology of Infectious Diseases (BEID) to whose birth I and many of my co-workers contributed.

Finally, in the past I was also active in epidemiology of cancer, see [2003-4, -5], work done for the **EU European Code Against the Cancer 2003**. Methodologically, in [C2] I introduced the bivariate Moran index, quantifying how much two lattice-based maps are similar. This was done to compare pairs of cancer mortality maps for the **WHO Atlas of the Cancer Mortality in Europe**. I also applied that index to study lattice approximations of stochastic fields defined by **Stochastic Ginzburg-Landau Stochastic PDE** [2012-6].

My approach to Mathematical Biology. When I started working on biomathematics there were two main approaches. The first was purely mathematical: the biological topic in study was only the starting point to do mathematics, often resulting in theorems divorced from the reality. Other scientists were instead only focused on simulations. I choose an approach different from both these approaches. I employ rigorous mathematics but in strict contact with the biomedical problem in study: mathematical analysis can be at the same time rigorous and providing rich biological inferences. However, I am also conscious that in nonlinear biophysics problems simulations are a precious tool to be used in all occasion where an exact or approximate analysis is impossible. Another characteristic feature of my research (the evidences of my claim stands in the many papers where I am single author and those where I had non-mathematical co-authors) is that I use the typical inter-disciplinary approach of modern mathematical physics. This approach mirrors the composite and complex nature of biomedical and social phenomena. I never stopped investigating a phenomenon because my previous intellectual toolbox could not master the phenomenon or, even worst, because my tools imply a model that operates a major distortion of the underlying biomedical reality. In these case my approach is deeply studying new concepts and tools, which I enrich my mathematical library.

Current Research Challenges In recent years, my research both in MO and in epidemiology is in part centered on a key concept of mathematical physics, the phase transitions, which often occur in complex systems in biology. A second research path is the mathematical analysis of the

economic planning of vaccine awareness campaigns by means of the Optimal Control, of which I had also a strong experience in my MO works. Finally, stimulated by Covid19 pandemics, I am focusing on searching the ways to go beyond current limits of BEID. As one of pioneers of BEID I cannot avoid seeing its limits and try to go beyond.

Editorial Boards:

- (1) *Journal of Optimization: Theory and Applications*, Springer; 2010–present <https://tinyurl.com/8456r9k6>
- (2) *PLoS ONE* 08/2018-present <https://journals.plos.org/plosone/static/editorial-board>
- (3) *ecancer.org* 2010–09/2018 : editorial board member; from 09/2018 : Advisory Panel Member for the Charity 'ecancer' <https://ecancer.org/en/journal/editorial-board/4>
- (4) *Mathematical and Computational Biology and Numerical analysis*, Aracne, 2016- present <https://tinyurl.com/hc9cbvlx>
- (5) *Advances in Difference Equations*, Springer 02/2018-06/2019
- (6) *Abstract and Applied Analysis*, Hindawi 2011/2012 <https://tinyurl.com/1i5n509m>
- (7) Advisory Board Member of *Theoretical Biology Forum* (07/2017-present) <https://tinyurl.com/h8cfs5hu>
- (7) *Entropy* (starting from April 2021)

Projects of International Institutions:

- (1) 2002 - 2003, European Code Against the Cancer 2003 Role: Member of the Statistical Sub-Committee
- (2) 2003 - 2009 WHO Atlas of the Cancer Mortality in Europe (Chair: P. Boyle). Member of the Scientific Committee
- (3) FEB/2006-JAN/2010 EU Project 'Advancing Clinical-Genomic Trials on Cancer' (ACGT). Role: key scientist and IEO unit research co-coordinator (Assigned 26000 Euros but not implemented due to an error of the Human Resources office)
- (4) 2009 - 2010 ECDC Project 'Vaccine preventable diseases modelling in the European Union and EEFTA countries: forecasting the effects of introducing a new vaccine in a national/regional programme Role: Scientific unit coordinator at IEO (Project cancelled in 2010 due to EU funds cut)
- (5) FEB/2010- DEC/2013 EU project P-medicine. Key scientist. Grant Share: 54000 euros + admin funds
- (6) JAN/2014 - DEC/2017 EU FP7 Project ASSET on Epidemics and Pandemics. Scientific Unit Coordinator at iPRI
- (7) JAN/2020- JUN/2020 EU H2020 Project INSTAND-NGS4P. Scientific unit coordinator for iPRI

Reports for EU Projects:

- E1. A. d'Onofrio. From Modelling Epidemics to Modelling Human Behaviour Impact on Epidemics: Perspectives for Science in Society. 'ASSET Papers Series' N. 1 'Public health emergencies: response and preparedness', 10-13 (2016) <https://tinyurl.com/9ttarrbd>
- E2. A. d'Onofrio (co-corresponding author) and Mitra Saadatian-Elahi. Open and Responsible Research and Innovation in Pandemics. 'ASSET Papers Series' N. 2 'Epidemics and Pandemics: The response of Society', 10-15 (2016) <https://tinyurl.com/3auwvewh>
- E3. A d'Onofrio and Mitra Elahis Saadatyan ASSET DELIVERABLE 'TASK 2.2 REFERENCE GUIDE OF UNSOLVED SCIENTIFIC QUESTIONS RELATED TO PANDEMICS AND EPIDEMICS' (2015) <https://tinyurl.com/cjw865d6>
- E4. A d'Onofrio and Mitra Elahi Saadatyan ASSET DELIVERABLE 'D3.2 - Roadmap to Open and Responsible Research and Innovation in Pandemics' (2016) <https://tinyurl.com/4zt525rc>
- E5. Alberto d'Onofrio (coordinator) ASSET DELIVERABLE D5.2 'Best Practice Platform & Stakeholder Portal Report' (2017) <https://tinyurl.com/kb6yuj4x>
- E6. Alberto d'Onofrio (group author) ASSET EU DELIVERABLE D5.3 'Local Initiative Report' (2017) <https://tinyurl.com/4ruwhjpn>
- E7. Alberto d'Onofrio (group author) ASSET EU DELIVERABLE D7.9 - 'Summer School Report 1' (2016) <https://tinyurl.com/yzb5hwa2>

E8. Alberto d'Onofrio (group author) ASSET EU DELIVERABLE D7.10 - 'Summer School Report 2' (2017) <https://tinyurl.com/y938whjw>

E9. Alberto d'Onofrio (group author) *P-medicine* EU Project deliverable D12.1 'Architecture and information flow diagrams of the Oncosimulator and the biomechanism models' (2011) <https://tinyurl.com/ya9u2w9k>

E10. Alberto d'Onofrio (group author) *P-medicine* EU Project deliverable D12.3 'Report on the development of the Oncosimulator and the utilization of the biomechanism models' (2013) <https://tinyurl.com/3meww5fz>

E11. Alberto d'Onofrio (group author) ACGT EU Project deliverable D8.4 'Report on the clinical adaptation and validation procedure of the Oncosimulator and its integration into the ACGT architecture' (2010) http://acgt.ercim.eu/uploads/media/ACGT_D8.4_FINAL.pdf

Management

(1) OCT/2009-OCT/2012 IEO coordinator and 'designer' of the formal agreement of collaboration between IEO and Pisa University. See copy of contract at <https://www.unipi.it/ateneo/territorio/ConvenzioneIEO.pdf>

(2) FEB/2006-JAN/2010 IEO unit research co-coordinator of EU FP6 Project 'Advancing Clinical-Genomic Trials on Cancer' (ACGT). (3) JAN/2009 - DEC/2013 Group leader of the Research Group *Systems Biomedicine* at the *Department of Experimental Oncology* of the *European Institute of Oncology*, Milan (Italy). Composition: myself and Dr Sebastiano de Franciscis (NOV/2011-DEC/2013) <https://tinyurl.com/kgbjuxjb>

(4) MAY/2014-DEC/2017: Scientific Unit Head of IPRI in the EU FP7 project ASSET

(5) JUN/2016- DEC/2017 Task-Leader of the Task 5.3 of the EU FP7 ASSET project.

(6) At the *International Prevention Research Institute* none had an established group, we shared when needed the work of the 5 junior scientists. During this ASSET Task 5.3, Dr A. Macacu and MS M. Dragomir worked for that Task for about 33% of their Person-Months.

(7) I organized as chair organizer three successful one week International Conferences at the Ettore Majorana Institute in Erice (Italy), attended as invited speakers by some of the major world biomathematicians and theoretical biophysicists, among which: Avner Friedman, Nicola Bellomo, Vincenzo Capasso, Vittoria Colizza, Odo Diekmann, Mats Gyllenberg and Alessandro Vespignani, etc...

Scientific and Work Network

In the fields of Mathematics and Physics, my scientific network of coauthors is strongly international: my coauthors work in mathematics and physics departments in **4 continents: Europe, Africa, Asia and America**.

The complexity of my research topics and my work experiences in very different institutions and international projects led me to have a composite and inclusive world-wide professional network going well beyond the usual hard sciences institutions, and including: National Public Health Institutes, Gender Studies, Charities, Hospitals, Science Communication SMEs, Economics Departments, Molecular Biology Departments, Industries, Patients Associations, Medical Ethics Departments.

Mobility

My work life was characterized by mobility: geographic, thematic and sectoral. This developed my adaptation and communication skills. Mobility experiences were also very helpful to build a large network. Adaptation, communication and networking are ideal conditions for interdisciplinary research with multi-disciplinary teams.

Details of Mobility :

International and National Geographic Mobility: I moved from Italy, to France in JAN 2014; **National Geographic Mobility:** After my High School in Calabria, I got my MSc in Pisa, then I moved to Rome for my PhD and finally I moved to Milan;

Thematic Mobility My MSc was on control engineering; then I moved to biomathematics. During my PhD I was focused on Mathematical Epidemiology and, in part, in Computer Sciences (so that I have 2 publications in that field). In year 2000 I started to work in Mathematical Oncology.

Mathematically I made my first steps in the field of deterministic dynamical systems described by ordinary differential equations, but soon I started also working with PDEs. Then I switched part of my activity on bounded stochastic processes (temporal and spatiotemporal) and hybrid stochastic systems. Often I work on Optimal Control. Finally, as it can be inferred from my single-name publications, I work both in the biological modelling (and interpretation of results) and in its mathematical analysis as well as also on the numerical simulations;

Work Type Mobility I was PhD student in a public research institute focused on biomathematics and computer science, and part time I was software consultant in a wide international institution (FAO UN) (more than 3000 workers in Rome). Then I moved to a large (1200 workers about) Research Oncology Hospital, and finally I moved to a small but influent SME working on Research on Global Public Health. Moreover I had also two long periods in which I was workless, which were (and the current is) very educational.

Research in Private Sector

All my career after the PhD has been in private research institutes. The first part (2000-2013) was at the European Institute of Oncology, where the research was mainly academic. However, it was not possible for me to enrol PhD students in Applied Mathematics since the only doctoral school linked to the institute was in Molecular Medicine. Thus when I was funded by EU project P-Medicine I preferred to have a Post-PhD fellow. The second part (2014 to 2020) was at the 'International Prevention Research Institute', a small but prestigious research center. Due to a loyalty agreement, I cannot disclose all the details of my work at IPRI but in general I can safely say that my activity although in toto devoted to scientific research in biomathematics and other duties of research directors, also involved to participate to private consulting reports for International clients, including writing reviews for white books, and contributing to the design of private and EU grant proposals (strongly involving biomathematics). I was also the IPRI main scientist in a EU research project, ASSET, aimed to design an action plan for pandemic preparedness. Before my dismissal from IPRI I had started to work to a EU project INSTAND NGS4P to whose proposal I had contributed with important pieces of work, and where I had to be particularly involved in the topic of 'Science in Society' in collaboration with the European and the Italian Cancer Patients associations.

A part of IPRI activity that is worth of mention, and in which I have also been involved, is its past commitment in favor of the South Countries, especially Latin America, sub-equatorial Africa and Far-East countries, resulting in a number of Memorandums of Understanding, Public Health actions, Science Communication Actions, and public-health related scientific and non-scientific publications. This kind of work, for example, made me in contact with the *NGO Emergency*.

Finally, at IPRI it was not possible to have PhD students: we only had two students under the supervision by our President.

For Reference Letters please contact: Vincenzo Capasso - ADAMSS (Centre for Advanced Applied Mathematical and Statistical Sciences) Milano University (vincenzo.capasso@unimi.it), Antonio Fasano - Accademia dei Lincei and FIAB SrL (a.fasano@fiab.it), Pierre-Alexandr Bliman at INRIA and "Laboratoire Jacques-Louis Lions" of Sorbonne University in Paris (pierre-alexandre.bliman@inria.fr), Mark Chaplain - Dept of Mathematics of St Andrews University UK (majc@st-andrews.ac.uk), Heiko Enderling - President Elect of the Society of Mathematical Biology and Moffitt Cancer Center USA (Heiko.Enderling@moffitt.org), Abba Gumel - Department of Mathematics of Arizona State University USA (agumel@asu.edu), Sergei Petrovskij - Department of Mathematics of Leicester University UK (sp237@leicester.ac.uk), Luigi Preziosi - Department of Mathematics of Politecnico di Torino (luigi.preziosi@polito.it), Ezio Venturino Department of Mathematics of Torino University (ezio.venturino@unito.it)

Main Areas of Research (all interplaying):

Behavioural Epidemiology of Infectious Diseases

Description The world attitude towards vaccines radically changed in last twenty years. Rumors of possible very serious side effects of vaccines started being amplified by Internet. This induced

a dramatic decrease of vaccination rates. On the one hand antivax groups are exceptionally gifted in diffusing fake news; on the other hand a totally new phenomenon arose: the PROVA, i.e. the Pseudo Rational Objection to Vaccination. This means that increasing number of persons started to be attracted by the following pseudo rational reasoning: “*Why must I expose my children to serious side effects of vaccines anti polio if polio is disappeared from my country?*” This reasoning is only apparently rational because the reason why the disease is no more present is because of the very large levels of vaccination. Moreover the risk of vaccination side effects is inflated and the disease associated risk is erroneously considered zero. Note that this kind of schema can even be adapted to the adopting or not behaviors reducing the risk of infection. As a consequence, classical models of mathematical epidemiology, that had been a powerful and elegant tool for national and international Public Health agencies, started failing to capture the new reality. We soon understood the reasons: classical models (centered on a chemical physics approach where infection is modeled as if it were a chemical reaction) did not take into the account a necessary ingredient : the role of human behavior. The inclusion in modeling of this factor gave birth to the **Behavioral Epidemiology of Infectious Diseases** (BEID). My work on BEID is to map in mathematical structures the above depicted scenarios and then interpreting from the Public Health viewpoint the mathematical results.

Originality and difficulty In [2007-4,2008-6,2010-6,C8] we proposed a model of behavior–based voluntary vaccination and we introduced even a second factor: the information used to take vaccine-related decision. This is important since subjects can use to take decisions even past information: a sort of ‘memory’ of the spread of the disease. This means temporal non-locality resulting in integrodifferential models, which can be reduced to a finite dimensional model in case the memory decays exponentially [2007-4, 2010-6, C8]. Our model showed that policies based on the good will of citizens that in case of epidemic outbreaks run to vaccinate their children is a failure because the eradication is impossible. Indeed, the condition for the global stability of the disease free equilibrium requires that the fraction of people that spontaneously vaccinates their children is equal to the vaccination threshold under mandatory vaccination. Moreover, due to the temporal nonlocality of the memory the behavioral vaccination can lead to a series of recurrent epidemics. Recurrent oscillations can also occur in presence of latency states in the disease [2013-3] or in case of multi stage models of memory [C8].

The second pillar where the behavior influences the spread and control of an infectious disease is social distancing, first stressed by Capasso and Serio in 1978. We introduced the modelling of information and memory in the framework of the Capasso-Serio model and we showed that memory can induce oscillations [2009-5,C15].

In [2008-5] and other works we studied global conditions that allow the avoidance of recurrent epidemics, i.e. that the behavior induced endemic equilibrium is globally stable. We adopted both Liapunov functions [2017-1] (social distancing models) and the Li-Muldowney methods [2008-5,C9] (vaccination models).

We then passed from a phenomenological approach to vaccination to one based on game theory [2009-7]. In particular we focused on an approach where the pro-vaccine and the hesitant parents change dynamically their strategies following an evolutionary imitation game [2011-3] where the switching to the anti-vaccine strategy is an increasing function of the vaccine side effects. We obtained that recurrent regular or even irregular epidemics can occur and that to achieve large levels of vaccinations it is necessary to have a huge disproportion between the perceived risk of damages from the disease and the one from vaccine side effects. Later we introduced an equivalent model based on the concept of *double infection of ideas* [2016-7]. This allows more clearly to figure out the phenomena at hand w.r.t. the economic approach to Game Theory.

In [2012-8] we modelled a key factor: the actions of public health authorities to favour the vaccination. The model suggested that at an adequately large level of effort the disease elimination could be reached (see also [2018-1,-3]), and at lower levels the state effort has at any case a stabilizing positive effect.

In this way we contributed to the birth of a new scientific discipline: the BEID, and I and P Manfredi also edited the first work ever published on this topic [EB2] *Modeling the Interplay Between Human Behavior and the Spread of Infectious Diseases*, Springer (2013), (> 200 citations). We also

coauthored [2016-3] *Statistical Physics of Vaccination* (> 570 citations), published in the prestigious series Physics Reports in 2016.

In [C15] we showed that in case of imperfect vaccine in SIS epidemic model behavior-dependent vaccination can induce the onset of multistable **endemic** steady states.

We faced the problem of optimally shaping the vaccine awareness campaigns via Optimal Control in three recent papers [2019-1,-2,2021-1]. We obtained that if the cost of the awareness campaign is not very small the actions of the PH must exhibit oscillations [2019-2,2021-1]. We considered both continuous and realistic piecewise control [2019-2,2021-1]. The problem is numerically stiff and in certain cases the Forward-Backward-Sweep algorithm did not converge [2019-2] producing a chaotic output [2021-1]. The application of stochastic optimization algorithms suggested that the optimal control is robust: large temporary deviations from the optimum do not impact on costs [2019-2].

I participated to a scientific research [A3] on Twitter that stressed, by means of *sentiment analysis*, how rapidly the public opinion could be made disoriented by contrasting political messages. I took into the account the extreme volatility of public opinion and obtained a vaccination model where the actions enacted by the state appears as a control acting in a nonlinear way on the controlled system [2021-1], implying a series of analytical and numerical challenges.

Recently, we showed that spatiotemporal behavioral dynamics concerning vaccinations and social distancing lead to interesting phenomena. Concerning social distancing, in [2020-1] we showed that avoidance of places at high prevalence of infectious subjects is able to destroy both Turing and Turing-Hopf patterns. Thus, social distancing might reduce the occurrence of spatial clusters and of spatiotemporal complex patterns of disease spread. Concerning the role of spatial information in vaccination decisions, in [2019-3] we investigated the apparently simple case of spatially extended vaccination in absence of disease. The dynamics of this case in the nonspatial setting is simple. This is not the case if space is considered. Indeed, one must model the spatial component of the information on the disease spread: subjects could consider local or global or non-local information. We thus showed that classical and generalized traveling waves can occur, which can be destroyed by vaccine awareness campaigns.

The current Pandemics is an occasion to rethink BEID. A strong limitation of BEID is that it missed a fundamental ingredient: the behavior of policy-makers. We published a preprint on this subject [A2] where we proposed a complex \textit{lockdown game} played by policymakers, opposition, lobbies. This game on the one hand impacts on the disease spread via lockdown decisions and is influenced by the epidemic outbreak.

Impact Our work on BEID has influenced the Epidemiology community, as it can be seen from the large number of citations of our books and papers, the adoption and extension of our methods by many other groups, and by the fact that Prof Alessia Melegaro of Bocconi University has recently won a ERC Grant on BEID. Both in France and elsewhere our 2013 book is considered the main reference on BEID. And without doubt even the work of the international scientific community on BEID has influenced our work in this field in many aspects. For example the importance of the paradigm of OC that we adopted for modelling the optimal planning of vaccine awareness campaigns.

Papers/Books 2007-4, -7, 2008-5,-6, 2009-5, -7, 2010-1,-6, 2011-3, 2012-2, -8, 2013-3, 2016-1, 2016-6, -7, 2017-1, 2018-1, -3, , PrNI2019-1, 2019-1,-2, 2019-3, 2020-2, 2021-1, EB2,C7, C8, C9, C15, A2 Dissemination publications: EC3, E1, E3, In2

Pulse Vaccination Strategy and other Impulsive Models

Description Pulse Vaccination Strategy (PVS) is a vaccine scheduling where periodically a fraction of the population is vaccinated in a very short time w.r.t. the typical times of the disease spread in the population. Mathematically this means that the state variable describing the proportion of healthy people has periodic pulses and the Agur model is based on Impulsive Differential Equations (IDEs). A key question was ‘can this type of vaccination campaign be able to robustly eliminate a disease from the target population ?’ I rigorously showed that this can be true. Analogously, one can consider that even certain therapies against cancer are of impulsive nature, and I applied my

experience in modeling PVS to the field of Mathematical Oncology (MO) and recently in Entomology.

Originality and difficulty Z Agur introduced the mathematical modelling of the PVS for SIR diseases but her results were only local. During my PhD I extended the model to SEIR diseases, i.e. having a latency period, but analysis remained local. After my PhD I faced the problem of global stability of the disease free equilibrium induced by the therapy in SEIR, SIR and other models (also considering seasonal fluctuations in the transmission rates) [2002-1,-2,2004-2,2005-1,-5,P2] (see also [2003-1,2005-6]). I was able to solve the problem by using techniques of monotone dynamical system, i.e. the biological concept of cooperation. I tried to extend this work to all main cases of interest; in particular taking into the account the possible non-exponential distribution of the permanence times in the compartments [2004-2]. Impulsive vaccinations have even analogies with many anti tumor therapies where the effect of a shot of the drug rapidly induces the death of tumor cells. In both cases the actions against the external agent is modellable by means of IDEs, see the following global stability results of those IDE models [2004-3,2005-4,2006-2,2012-4] Recently I started a collaboration with Prof. P-A Bliman, of *Inria* at “Jacques-Louis Lions” of *Sorbonne University (Paris)*, in a new field: IDEs to model the control of mosquitos populations

Impact Practically the vast majority if not all papers on Pulse Vaccination Strategy (and many papers on IDEs) cite or are directly inspired from my works and implement and/or extend my methods. Papers/Books: 2002-1,-2,P2 , 2004-2,2005-1,-5,-6, 2004-3,2005-4,2006-2,2012-4,U4

Bounded Stochastic Processes and their applications in biomedicine

Description No biological system is fully isolated. In many cases there are un--modelled interactions with the external ‘worlds’. These can be represented by stochastic fluctuations of model parameters. A classical way is to represent them as a white or colored Gaussian noises. I showed that this approach can induce major artifacts in Mathematical Oncology and other fields, and by using classes of bounded stochastic processes to model these perturbations I obtained more realistic results and relevant biomedical inferences.

Originality and difficulty Puzzled by strange results in stochastic literature, I wrote a paper [C1] stressing that the use of white Gaussian noise to model perturbations of chemotherapy induced two kinds of artifacts: 1) in many instant the therapy **adds** tumor cells **instead of killing** them: a **huge artifact** 2) the instantaneous concentrations of the drug can become excessively large: another **huge artifact**. Hence the need of using Bounded Noises (BNs). A major difficulty was that very few results on BNs existed in stochastic calculus literature. In [2008-4] I faced this problem by means of fuzzy BNs, and I even gave the first definition of fuzzy bifurcations, a concept previously used informally. Later, in statistical physics journals I discovered that some works on BNs existed.

In [2010-7,C5] I worked on the impact of BN on the Tumor-Immune System interplay: a non-mutational evasion from the control can occur in realistic timespans. We thus investigated the role of bounded stochastic perturbations affecting chemotherapy of tumors [2011-2,2012-7]. BNs perturbations can induce transitions from a small size state of controlled tumor to a theoretical large state, often incompatible with life. This can be read as an unexpected non-genetic kind of resistance to chemotherapy.

My joint interests on systems biology, BNs and birth death modeling conducted me to extend the Gillespie algorithm to deal with birth and death models whose *propensities* are affected by BNs [2013-4,P8,C12].

Interestingly, ON/OFF dynamics of gene switching is a form of ‘internal’ BN influenced and influencing the dynamics of the related biomolecular network and its response to drugs [2014-3,2014-4,2016-4] (see next sect.).

The above background allowed us to study the simplest bistable biomolecular network: the self-activating transcription factor. We showed [2016-3,2018-4] that the presence of BNs can induce

in this module phenomena distinct from noise-induced transition and instead very close to first order phase transitions, typical of spatially extended phenomena.

As far as space is concerned, we defined some among the first examples of spatiotemporal BNs [2012-6,2013-5,C11] and applied them both to the Ginzburg-Landau PDE model of phase transitions [2012-6,2013-5,C11] and to a model of cell polarization via wave-pinning [2013-6,2014-3].

Note that in 2013 I edited the first ever published book on BNs [EB3] *Bounded Noises in physics, Biology and Engineering* (Springer Birkhauser). Another literature gap was the lack of stochastic calculus works on main BNs. We filled this gap [2017-2,2020-1]. In particular we showed [2017-1] that the Tsallis-Stariolo-Borland BN can become unbounded if its key parameter is <0 . This was paradoxical since this BNs is generated by an overdamped Newton equation with a stochastic force. We showed that [2017-1] the full Newton equation generates a bounded process, thus it is the overdamping approximation that fails.

Impact Especially in the field of Statistical Physics and Control Theory, my works on BNs has influenced many works. Papers/Books 2008-4,2010-7,2011-2,2012-6,-7,2013-4,-5,-6,2014-3, 2017,-2, 2020-1, 2016-3,2018-4,P8,C1,C5, C11,C12

Mathematical Oncology

Description Anti-tumor drugs usually aims at killing tumor cells and/or stopping their cell cycle. Indirect strategies can also be devised, e.g. killing the tumor blood vessels to kill the tumor by 'starvation'. Mathematical Analysis and simulations can help to infer the conditions to robustly eliminate a tumor or at least to have a better result. I particularly focused on anti-angiogenic therapies and on intracellular effects of some drugs. Another key field is the understanding of tumorigenesis, where I proposed a simple mechanism based on the fact that even relatively simple entities such as colon crypts can be considered as a complex system.

Moreover, Erlich, father of Immunology, first hypothesized that Immune System (IS) can 'kill' tumors. However, experimental oncologists denied for decades the relevance of Tumor-IS interplay (TISI), partly due to unfit animal model. Epidemiological evidences of association between immunosuppressive therapies and cancer onset gave the impulse to the rebirth of immunoncology, helped by improved animal models. My role in this field has been essentially to link the difficulties of immunotherapies to the fact that TISI is a complex multistable system. Moreover, an outstanding concept arose: the existence of evolutionary immunoevasion. In this field I proposed and mathematically modeled some non-genetic paths.

Originality and difficulty We made a complete investigation and extension (e.g. considering Proliferating vs Quiescent endothelial cells) of the Folkmann model [2004-3,2006-3,2009-3,2007-6] by providing global eradication results, from the analytical viewpoint. Then we proposed and conducted a mathematical analysis of a new family of models of vascularized tumor growth and anti angiogenic therapy [2009-4]. By means of simulations we showed that [2004-3,2009-3,2009-4] the nonlinear interplay between tumor cells and their vessels explained experimental results in favor to continuous infusion therapies w.r.t. normal drug scheduling. We also proposed a model of chemotherapy of solid vascularized tumors [2010-4] that takes into the account the role of vessel density in the delivery of chemotherapy (which also affects vessels). The resulting model is bistable and the therapy outcome is strongly dependent on the therapy scheduling, as in some experimental studies. We also proposed a bistable model of therapy of non vascularized tumors where the bistability is induced by a Norton-Simon like effect [2012-7].

In reality therapies are delivered for a finite time and the amount of delivered drugs must be limited to limit toxicity. To study this case we applied Optimal Control (OC) theory. The quantity to be minimized is the final tumor size, with constrained total delivered drug. This resulted in complex OC problems where optimal therapy profiles can have singular arcs [P4,P6,Jn2,2009-3,P6,C4,C6].

We proposed a new law of tumor growth [2011-5], fully compatible with the Gyllenberg-Webb model of interaction between proliferating and quiescent tumor cells, which fitted some experimental data of tumor spheroid growth.

Concerning tumorigenesis, we proposed [2007-2] a model of a multistable tumor crypts population dynamic based on positive feedbacks, resulting to the possible onset of tumorigenesis via a hysteresis bifurcation or stochastic bifurcations.

At microscopic level, we studied how the stochasticity induced by gene ON/OFF switching can impact on the Pharmacodynamics of anti tumor drug Nutlin, aimed at restoring physiological levels of P53. We defined a very detailed hybrid stochastic model of the P53 network [2014-4] (and simpler models [2016-4]) and we were able to mimic some key experimental curves.

Very recently we published a model of the spatiotemporal dynamics of growth of a vascularized tumor where we propose a detailed models of chemotactic based vessel cooption [2021-2]. We are now working in two directions to extend that work. First, the definition of a more accurate statistical mechanics-based model of chemotaxis in vessels cooption; second, modeling the impact of chemotherapy and the possible induction of phase transitions.

As far as the immunology of cancer is concerned, initially I was in particular interested in three questions: 1) why the clinical studies of 'adoptive immunotherapy' (AI) at that time were so puzzling ? and 2) why there was a sort of 'epidemics' of models of TISI that were all so similar ? 3) which is the impact of the drug scheduling in AI ? First, in [2005-4,2006-2] I showed that the puzzling outcomes of AIs were the result of the multistability of TISI and I gave conditions for the global stable tumor elimination. Second, I defined a family of models, stopping the 'epidemics' of models of TISI. Third, my simulations suggested that there was no difference between a continuous infusion AI and a more conventional AI

I was one of the first to model immunoevasion [2007-1,2008-2,2010-5], initially phenomenologically, then proposing mechanisms of evasion by intercellular communication [2011-8], by evolutionary learning [2012-5] and by spatial chemo--repulsion [2012-1].

Oscillations of course also affects TISI (and also the tumor-vessels interplay [2005-4]). A first mechanism triggering oscillations, as suggested by Panetta and Kirschener (PK), simply derives from model nonlinearity (as I did in [2012-1]). Although the PK model was able to explain oscillations of some immunogenic tumors, yet it did not allow for spontaneous control of new tumors by IS. We showed in [2010-9] that tumor suppression by IS could sometime occur by stochastic oscillations. To show this we transformed the PK ODE model in a hybrid model where cytokines dynamics was modelled by an ODE and the cellular populations by a nonlinear birth and death process. Later, we included various kinds of immunotherapies in [2012-4]. A second mechanism triggering oscillations is the delayed onset of IS reaction to tumor dynamics, which we studied by means of delay differential equations [2010-3] and delayed hybrid stochastic processes [2013-1] (see also [2014-2,P7]).

Impact Widely cited works and methods intensely applied and extended, esp. on immune-oncology and angiogenesis. Papers/Books:EB1,EB4,2003-3, 2004-1, -3, 2006-3, 2007-2, -6, 2009-1, -2, -3, -4, -6, 2011-2, -5, -7, 2012-7, 2014-4, 2016-4,2021-2, P4,P5,P6, 2005-4,2006-3, 2007-1, 2008-2, 2010-2,-3,-5,-9, 2011-8, 2012-1, -4,2013-1,2014-1,-2,P7,C6

4. Scientific production and coordination

ID number (researcher ID) for the Web of Science and/or ORCID: ORCID 0000-0002-3054-1567

4.1. Academic output (publications)

4.1.1. Articles

Articles: Peer reviewed and indexed: 100; Peer-reviewed and non-indexed: 1

Peer-reviewed and indexed Articles published in Internatioal Journals:

- 2001-1** E. Pourabbas, A. d'Onofrio, M. Rafanelli: A Method to estimate the incidence of communicable diseases under seasonal fluctuations with application to cholera, 'Applied Mathematics and Computation', 118/2-3 (2001) pp 161-174 [https://doi.org/10.1016/S0096-3003\(99\)00212-X](https://doi.org/10.1016/S0096-3003(99)00212-X)
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- 2003-6** A.d'Onofrio (Corr. Auth.) and E. Pourabbas Modelling temporal thematic map contents, A.C.M. S.I.G.M.O.D. Record, vol 32, No. 2 - June 2003, pagg 34-41, <https://dl.acm.org/doi/pdf/10.1145/776985.776990>
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- 2011-8** A. d'Onofrio (Corr. Auth.) and A. Ciancio, Simple biophysical model of tumor evasion from immune system control *Physical Review E* 84, Art. N. 031910, (2011) <https://doi.org/10.1103/PhysRevE.84.031910>

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- 2012-7** A. d'Onofrio (Corr. Auth.), A. Gandolfi, S. Gattoni The Norton-Simon hypothesis and the onset of non-genetic resistance to chemotherapy induced by stochastic fluctuations. Physica A 391, 6484-6496 (2012) <https://doi.org/10.1016/j.physa.2012.07.025>
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- 2018-3** Bruno Buonomo, Nakul Chitnis, Alberto d'Onofrio (corresponding author). Time heterogeneous programs of vaccination awareness: modeling and analysis. *Ricerche Di Matematica* (Springer) 67, pages 205-225(2018)<https://doi.org/10.1007/s11587-018-0364-1>

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2019-3 Antonella Lupica, Vitaly Volpert, Annunziata Palumbo, Piero Manfredi and Alberto d'Onofrio (Corr. Auth.) Spatio-temporal games of voluntary vaccination in the absence of the infection: the interplay of local versus non-local information about vaccine adverse events. *Mathematical Biosciences and Engineering* 17(2):1090-1131 (2019) <https://doi.org/10.3934/mbe.2020058>

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2021-1 Rossella della Marca (co-corresponding author) and Alberto d'Onofrio (co-corresponding author) Volatile opinions and optimal control of vaccine awareness campaigns: chaotic behaviour of the Forward-Backward Sweep algorithm vs heuristic direct optimization *Communications in Nonlinear Science and Numerical Simulation* (in press: accepted on Feb 14 2021) PDF at: <https://doi.org/10.1016/j.cnsns.2021.105768>

2021-2 Gandolfi, A., S. De Franciscis, A. d'Onofrio, A. Fasano, and C. Sinisgalli. Angiogenesis and vessel co-option in a mathematical model of diffusive tumor growth: The role of chemotaxis. *Journal of Theoretical Biology* (2021): 110526 <https://doi.org/10.1016/j.jtbi.2020.110526>

Peer-reviewed and non-indexed:

PrNI2019-1 Piero Manfredi, Ernesto Salinelli and Alberto d'Onofrio Lyapunov stability of an SIRS epidemic model with varying population: ecological vs physical approaches. *Far East Journal of Mathematical Sciences* Volume 117, Number 2, Pages 147-160 (2019) <http://dx.doi.org/10.17654/MS117020147>

MedRxiv or ArXiv Preprints and Economy Working Papers

A1. Luciano Fanti, Piero Manfredi Alberto d'Onofrio *Walrasian dynamics and the Phillips curve* Discussion papers of Economics Department of Pisa University n.141. (2012)

A2. Alessio Carrozzo-Magli, Alberto d'Onofrio, Piero Manfredi '*Deteriorated Covid19 control due to delayed lockdown resulting from strategic interactions between Governments and oppositions*' *medRxiv* (2020) <https://doi.org/10.1101/2020.05.26.20112946>

A3 Samantha Ajovalasit, Veronica Dorgali, Angelo Mazza, Alberto d'Onofrio, Piero Manfredi. 'Evidence of disorientation towards immunization on online social media after contrasting political communication on vaccines. Results from an analysis of Twitter data in Italy' Submitted to PLoS ONE (2020) <https://arxiv.org/pdf/2002.00846>

A4 B Buonomo, A d'Onofrio, SM Kassa, Y Hailu Workineh *Modeling the effects of information-dependent vaccination behavior on meningitis transmission* (2020) Submitted to MMAS <https://arxiv.org/pdf/2005.11823>

4.1.2. Book Chapters, Books, Special Issues and Prefaces

Book Chapters:

C1 A. d'Onofrio 'Noisy oncology: some caveats in using Gaussian Noise in Mathematical models of Chemotherapy', in E. Venturino and R. Hoskins (eds) 'Aspects of mathematical modeling' Birkhauser--Springer (2008) https://doi.org/10.1007/978-3-7643-8591-0_12

C2 C. Robertson, C. Mazzetta and A. d'Onofrio 'Regional Variation and Spatial Aggregation' chapter of P. Boyle and M. Smans (eds) 'The Atlas of Cancer Mortality in European Union and European Economic Area 1993-1997', WHO Press (2009) <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Scientific-Publications/Atlas-Of-Cancer-Mortality-In-The-European-Union-And-The-European-Economic-Area-1993-1997-2008>

C3 G.Stamatakis, D.Dionysiou, E.Georgiadi, E.Kolokotroni, S.Giatili, A.Hoppe, C.Desmedt, A.Lunzer, M.Erdt, J.Jacques, J.Pukacki, R.Belleman, P.Melis, A.d'Onofrio, F.Buffa, B.Claerhout, S.Rueping, K.Marias, M.Tsiknakis, N.Graf The ACGT Oncosimulator: from conceptualization to development via multiscale cancer modeling. In: G. Stamatakis and D. Dionysiou (Eds): Proceeding of the 4th Int. Adv. Res. Workshop on In Silico Oncology and Cancer Investigation (4th IARWISOCI) - The ContraCancrum Workshop, Athens, Greece, Sept. 8-9, 2010 (www.4th-iarwisoci.iccs.ntua.gr). Pages 54-57

C4 A. d'Onofrio, U. Ledzewicz and H. Schaettler. Tumor Development under Combination Treatments with Anti-Angiogenic Therapies, in 'Mathematical Methods and Models in Biomedicine' (editors: A. Friedman, E. Kashdan, U. Ledzewicz, H. Schaettler) Springer-Verlag (2012) https://doi.org/10.1007/978-1-4614-4178-6_11

C5 A. d'Onofrio, Multifaceted aspects of the kinetics of immunoevasion from tumor dormancy In: Heiko Enderling, Nava Almog, and Lynn Hlatky (Editors) Systems Biology of Tumor Dormancy. Advances in Experimental Medicine and Biology, Vol. 734 Springer Verlag (2012) https://doi.org/10.1007/978-1-4614-1445-2_7

C6 A. d'Onofrio, U. Ledzewicz and H.Schaettler. On the Dynamics of Tumor Immune System Interactions and Combined Chemo- and Immunotherapy. In A.d'Onofrio, P. Cerrai, and A. Gandolfi (Eds) New Challenges for Cancer Systems Biomedicine. Springer Verlag (2012) ISBN 978-88-470-2570-7, pages 249-266 https://doi.org/10.1007/978-88-470-2571-4_13

C7 C. Bauch, A. d'Onofrio and P. Manfredi, Behavioral epidemiology of infectious diseases: an overview. In: P. Manfredi and A. d'Onofrio (eds) Modeling the interplay between Human Behavior and Spread of Infectious Diseases, Springer Verlag (2013) ISBN 978-1-4614-5473-1 https://doi.org/10.1007/978-1-4614-5474-8_1

C8 A. d'Onofrio (Corr. Auth.), P. Manfredi and E. Salinelli, Vaccinating behavior and the dynamics of vaccine preventable infections. In: P. Manfredi and A. d'Onofrio (eds) Modeling the interplay between Human Behavior and Spread of Infectious Diseases, Springer Verlag (2013) ISBN 978-1-4614-5473-1 https://doi.org/10.1007/978-1-4614-5474-8_17

C9 B. Buonomo, A. d'Onofrio (Corr. Auth.), and D. Lacitignola, The geometrical approach to global stability in behavioral epidemiology. In: P. Manfredi and A. d'Onofrio (eds) Modeling the interplay between Human Behavior and Spread of Infectious Diseases, Springer Verlag (2013) https://doi.org/10.1007/978-1-4614-5474-8_18

C10 A.d'Onofrio (Corr. Auth.) and A. Gandolfi. Bounded Stochastic Perturbations May Induce Nongenetic Resistance to Antitumor Chemotherapy, in A. d'Onofrio (ed) Bounded Noises in Physics, Biology and Engineering, Birkhauser, Boston (2013) https://doi.org/10.1007/978-1-4614-7385-5_11

C11 S. de Franciscis and A.d'Onofrio (Corr. Author). Spatiotemporal Bounded Noises and Their Application to the Ginzburg-Landau Equation, in A.d'Onofrio (ed) Bounded Noises in Physics, Biology and Engineering, Birkhauser, Boston (2013) https://doi.org/10.1007/978-1-4614-7385-5_8

C12 G. Caravagna (Eq. Contr.), G. Mauri, A. d'Onofrio (Eq. Contr. and Corr. Auth.). Bounded extrinsic noises affecting biochemical networks with low molecule numbers, in A. d'Onofrio (ed) Bounded Noises in Physics, Biology and Engineering, Birkhauser, Boston (2013) https://doi.org/10.1007/978-1-4614-7385-5_13

C13 A. d'Onofrio (corr auth) and P. Manfredi Bistable endemic states in a Susceptible-Infectious-Susceptible model with behaviour-dependent Vaccination. In G. Chowell Puente and J Mac Hyman Mathematical and Statistical modeling for emerging and re-emerging infectious diseases. Springer Verlag (2016) https://doi.org/10.1007/978-3-319-40413-4_21

C14 Valentina Possenti, Barbara De Mei, Paola Scardetta, Anna Kurchatova, Manfred Green, Harald Drager, John Haukeland, Eva Benelli, Alberto d'Onofrio, Agoritsa Baka, Mitra Saadatian, Vanessa Maria Moore, Kjersti Brattekas, Ariel Beresniak, Mircea Ioan Popa, Donato Greco, Alberto Perra. The ASSET Research Project as a Tool for Increased Levels of Preparedness and Response to Public Health Emergencies. In: Ferri, F., Dwyer, N., Raicevich, S., Grifoni, P., Altiok, H., Andersen, H.T., Laouris, Y., Silvestri, C. Responsible Research and Innovation Actions in Science Education, Gender and Ethics. 65-78 Springer (2018) <https://www.springer.com/gp/book/9783319732060>

C15 Alberto d'Onofrio (Corr. Auth.) and Piero Manfredi. The interplay between voluntary vaccination and reduction of risky behavior: a general behavior-implicit SIR model for vaccine preventable infections. In: E. Venturino and A. Pugliese (editors) Current Trends in Dynamical Systems in Biology and Natural Sciences, 185-203 Springer (2020) https://doi.org/10.1007/978-3-030-41120-6_10

Scientific Editing of Books (for all books I also cowrote or wrote its preface):

EB1 A. d'Onofrio (Corresponding editor), P. Cerrai and A. Gandolfi (eds) New Challenges for Cancer Systems Biomedicine. Springer Verlag (2012) <https://www.springer.com/gp/book/9788847025707>

EB2 P. Manfredi and A. d'Onofrio (equal contributor) (eds) Modeling the interplay between Human Behavior and Spread of Infectious Diseases, Springer Verlag (2013) <https://www.springer.com/gp/book/9781461454731>

EB3 A. d'Onofrio (editor) Bounded Noises and their applications in Physics, Biology and Engineering, Birkhauser Science-Springer Verlag Group (2013) <https://www.springer.com/gp/book/9781461473848>

EB4 A. d'Onofrio (corresponding editor) and A. Gandolfi Mathematical Oncology 2013, Birkhauser Science-Springer Verlag Group (2014) <https://link.springer.com/book/10.1007/978-1-4939-0458-7>

Editor of Special Issues of International Journals (for all I also cowrote or wrote its preface):

SI1. A. d'Onofrio (corresponding editor), P. Cerrai and A. Gandolfi (eds) Mathematical Oncology: proceedings of the Congress 'Mathematical Oncology: new challenges for Systems Biomedicine'- Erice September 26-30 2011 Special Issue of Mathematical Biosciences and Engineering, Vol 10(1) 2013

SI2. A. d'Onofrio (corresponding editor), P. Manfredi, P. Cerrai (editors) 'Proceedings of the Erice MathCompEpi Conference 2015', Special Issue of Mathematical Biosciences and Engineering 15(1), (2018)

SI3. B. Buonomo, N. Chitnis, A. d'Onofrio (editors), 'The role of Heterogeneity in the Spread of Infectious Diseases', special focus number of 'Ricerche di Matematica' (Springer) (2018) Ricerche di Matematica is an International Peer-Reviewed Journal, published in English by Springer-Nature Group

SI4. E. Augeraud, M. Banerjee, J.-S. Dhersin, A. d'Onofrio, T. Lipniacki, S. Petrovskii, Chi Tran, A. Veber-Delattre, E. Vergu and V. Volpert (Eds.) 'Coronavirus: Scientific insights and societal aspects' special focus issue of 'Mathematical Modelling of Natural Phenomena' (EDP Sciences) (2020)

6.1.3. Conferences, Minisymposia, Proceedings Papers etc..

Invited Talks at International Conferences:

IT1 A. d'Onofrio 'Behavioral Epidemiology: recent Past and Future'. Invited Planary Opening Lecture. International Workshop on Mathematical Modelling of Biological Systems. Numerical analysis and High Performance Scientific Computing of UK-Africa Postgraduate Advanced Study Institute (UK-APASI) in Mathematical Sciences, 15-19 MAR 2021, Edinburgh (UK).

IT2 A. d'Onofrio 'COVID19: what behavioral epidemiology is learning from the current pandemic' 12th International Conference on Dynamical Systems Applied to Biology and Natural Sciences DSABNS, 2-5 of February, 2021, <https://tinyurl.com/y9tqnscl>

IT3 A. d'Onofrio 'Behavioral Epidemiology: lessons learned from the current Covid19 pandemics' International Forum of Mathematics Mathematical contributions on the behavior of SARS-CoV-2, Autonomous University of Guerrero, 24 - 26 November 2020, Chilpancingo (Mexico) <https://fimathapplied.com.mx>

IT4 A. d'Onofrio 'Behaviour induced phase transitions in epidemiology of infectious diseases' 12th DSABNS, February 4-7, 2020, Trento, Italy <https://tinyurl.com/1i8p2e0h>

IT5 A. d'Onofrio. 'Behavioural Epidemiology and its limitations - I' plenary invited talk at 'Erice MathComp 2018 Mathematical and Computational Epidemiology of Infectious diseases' Erice (Italy), 28 August 2018 to 5 September 2018

IT6 A. d'Onofrio. 'Behavioural Epidemiology and its limitations - II' plenary invited talk at 'Erice MathComp 2018 Mathematical and Computational Epidemiology of Infectious diseases' Erice (Italy), 28 August 2018 to 5 September 2018

IT7 A. d'Onofrio. 'Some stochastic models in Mathematical Epidemiology and why they are wrong!' invited talk at 'Erice MathComp 2018 Mathematical and Computational Epidemiology of Infectious diseases' Erice (Italy), 28 August 2018 to 5 September 2018\\

IT8 A. d'Onofrio 'Antimicrobial Resistance: a challenge for Global Public Health' 8th National Cancer Institutes Directors Meeting July 11-13 2018 Lyon

IT9 A. d'Onofrio, Statistical physics of human behavior role in the spread of infectious diseases and in its mitigation, Plenary Invited Talk, 9th DSABNS Feb. 7-9, 2018 Torino, Italy <https://tinyurl.com/1x58erwv>

IT10 A. d'Onofrio, Optimal control of Public Health Intervention to increase Vaccine Propensity, Workshop 'Optimal control in Life Sciences - a conference in Honour of Urszula Ledzewicz', Porto, Portugal, July 1-5, 2017 (I could not go there for health problems)

IT11 Alberto d'Onofrio "Human Behavior and the Spread of Infectious Diseases: a challenge for modeling", International conference 'Mathematical and Computational Epidemiology of Infectious diseases - the interplay between models and public health policies', Erice (Italy), August 30 - September 5 2015, 'Ettore Majorana Centre for the Diffusion of Scientific Knowledge

IT12 A. d'Onofrio 'Human Behavior and the Spread of Infectious Diseases: a challenge for modeling', Keynote Invited Speaker and Opening Talk at the 3RD INTERNATIONAL SYMPOSIUM ON 'Modelling and Knowledge Management applications: Systems and Domains (MoKMaSD 2014)' in the 12th 'International Conference on Software Engineering and Formal Methods' - Grenoble, 2 September 2014 <http://sefm2014.inria.fr/workshops/index.html>

IT13 A. d'Onofrio 'The new mathematical theory of epidemics: cries, whispers and imitations' Keynote Invited Plenary Speaker MPDE 2014 - International conference on Models in Population Dynamics and Ecology. Torino, Italy. August 25th-29th, 2014 <https://tinyurl.com/1mx9bri9>

IT14 A. d'Onofrio 'Intracellular Pharmacodynamics of p53-targeting drug Nutlin: the role of stochastic gene switching' International INDAM Meeting 'The Mathematics of Cells and Tissues' September, 2-6, 2013 Cortona, Italy.
https://www.altamatematica.it/sites/default/files/ob_strategico_02.pdf

IT15 A. d'Onofrio 'The pharmacodynamics of p53-targeted drug Nutlin: a stochastic Systems Biology approach' International Conference 'Mathways into Cancer II', Carmona, Sevilla, Spain. May 27-30 2013

IT16 A. d'Onofrio 'Bounded-noise induced transitions in Cancer Dynamics' Keynote Invited Speaker and Opening Talk 'Mathways into Cancer I', Almagro, Ciudad Real, Spain. June 3--6 2012
<https://t.ly/Sc8A>

IT17 A. d'Onofrio 'Mathematical Modelling of Stem Cell Kinetics' Workshop '3rd Disputations on Native and Induced Pluripotent Stem Cell Standardization' Florence March 19-21 2012. See pages 8 and 14 of the Abstract Book <https://tinyurl.com/3jpnck8v>

IT18 A. d'Onofrio 'A bistable tale', Workshop in honour of Boris Kholodenko: Different aspects of mathematical modeling applied to systems biology', Genova November 10 2011

IT19 A. d'Onofrio, Systems Biology of Tumor Dormancy, Invited Talk at the 'First Workshop on Systems Biology of Tumor Dormancy', Boston (US), July 25th-28th, 2011. (not held due health conditions) <https://tinyurl.com/58jlt4y5>

IT20 A. d'Onofrio, Evolutionary aspects in tumor immunoediting, Conference 'Mathematical Oncology: new Challenges for Systems Biomedicine', Erice (Italy), September 26 - September 30 2011. Scientific Committee: Z. Agur, P. Cerrai, A. d'Onofrio (chair), A. Gandolfi.

IT21 A. d'Onofrio, Mathematical modelling of Neo-angiogenesis and of antiangiogenic therapies, Workshop 'Mathematical and Computational Approaches in Biology and Medicine', June 15-16 2009, Warsaw <https://tinyurl.com/16hqb0pi>

IT22 A. d'Onofrio, 'The strange case of Dr. Immune system and Mr. Cancer', Lectures on Modelling Cancer Growth and Treatments December 8-9, 2008, Estoril, Portugal
<https://tinyurl.com/1i1xynde>

IT23 A. d'Onofrio 'Metamodeling tumor-immune system interaction and immunotherapy: the interplay between basic science and clinical applications.' INRIA 'International Workshop on Cancer Modelling and Therapeutic Innovation: From Theory to Clinic' Lyon, September 26-27 2006. Organizers: Benjamin Ribba and Jean Clarambault (INRIA) <https://tinyurl.com/1kedim4a>

IT24 A. d'Onofrio 'Mathematical oncology: modeling anti angiogenic therapy', 45th workshop of international school of mathematics 'G. Stampacchia' : Mathematics and Medical Diagnosys' at 'Ettore Majorana center for Scientific Culture', Erice (TP) Italy, 10-20 July 2006.
<http://www.ccsem.infn.it/ef/emfcsc2006/pdf/Gaudioso.pdf>

IT25 A. d'Onofrio 'Interactions between biomathematicians and biomedical researchers' International workshop 'Random Geometries in biomedicine', Milan, Jan 16 2003. See page VII of the book: <https://tinyurl.com/1xear5hu>

Invited Talks at National Conferences

ITNat1 A d'Onofrio 'Behavioural Epidemiology and its limitations' I SamMBA Seminars, Institut Pasteur, Paris, SEP 11 2018 <https://tinyurl.com/p7cgen7f>

ITNat2 A.d'Onofrio, 'The role of extrinsic noise and its interplay with intrinsic stochasticity in biomolecular Networks' Invited Keynote Speaker, WORKSHOP BIOLOGICAL COMPLEXITY: PAST COMMITMENTS AND FUTURE CHALLENGES, Arcidosso (Italy) 19 - 21 September, 2013
<https://tinyurl.com/metdbgxw>

ITNat3 A. d'Onofrio 'The pharmacodynamics of p53-targeted drug Nutlin: an ibrid stochastic model' Invited Keynote Talk CIMAB and GASVA SIMAI Workshop on 'Theoretical Approaches and

Related Mathematical Methods in Biology, Medicine and Environment' April 4-6 2013
<https://tinyurl.com/1dguqo0f>

ITNat4 A. d'Onofrio 'Information, Vaccinations and Bifurcations' Workshop 'La Matematica Oggi per l'Uomo e per l'Ambiente' Montecatini, 28-31 March 2007

ITNat5 A. d'Onofrio 'Reti complesse di regolazione genica della proliferazione-differenziamento-tumorigenesi: applicazioni della Systems Biology' (Invited Speaker) Workshop on 'Mathematical diagnosis', School of Medicine of Pisa University, 9 jan 2007

Invited Talks at Minisymposia in International Conferences

IMinInt1 A d'Onofrio 'Vaccine opinion dynamics: imitation game reloaded' Minisymposium 'Epidemic models: from individual decision to collective dynamics' (Organiser: G. Turinici) at ECMTB 2018, Lisboa (Portugal) 22-28 July 2018 <https://tinyurl.com/dk1dhfr9>

IMinInt2 A. d'Onofrio, 'Tumor heterogeneity: one, none and one hundred thousand', Minisymposium 'Cancer modelling: discreteness and heterogeneity', (Organizers: G. Ascolani and P. Lio) ECMTB/SMB 2016, Nottingham, UK, July 11 - 16, 2016 (I could not go there due to the birth of my son) <http://www.ecmtb2016.org/>

IMinInt3 A. d'Onofrio, 'The interplay between delays and bounded noises in immune reaction to tumors', Minisymposium 'Delay Differential Equations and Applications I', (Organizers: U. Foray and M. J. Piotrowska) ECMTB/SMB 2011, Kraków, Poland, June 28 - July 2, 2011 <https://tinyurl.com/agxy5dp5>

IMinInt4 A. d'Onofrio, 'The Noisy life of Tumors' Minisymposium 'Analysis of mathematical models for cancer growth and treatment, Part I', (Organizers: U. Ledzewicz and A. d'Onofrio) ECMTB 2011: 8th European Conference on Mathematical and Theoretical Biology, and Annual Meeting of The Society for Mathematical Biology, Kraków, Poland, June 28 - July 2, 2011 <https://www.impan.pl/~ecmtb11/index.php?file=mini.html>

IMinInt5 A. d'Onofrio, 'Modelling the evasion of tumors from immune control', Workshop 'Mathematical Cancer Modelling' (organizers T. Hillen, U. Ledzewicz and A. Chauviere), 8th AIMS conference on Dynamical Systems, Differential Equations and Applications, Dresden (GE), May 25-28 2010 <https://tinyurl.com/1pcq2cbv>

IMinInt6 A. d'Onofrio, 'Population-based models of anti-tumor anti-angiogenesis therapy: theory and biomedical inferences', Minisymposium on 'Modelling, Control and Optimization of Dynamical Systems: Theory and Applications to Biomedicine' (organizers: U. Ledzewicz, H. Schattler and A. Swierniak), 23rd IFIP TC 7 Conference on System Modelling and Optimization, Cracow, Poland, July 23-27, 2007 <https://tinyurl.com/1151tyrm>

IMinInt7 A. d'Onofrio 'Metamodels in tumor-immune system interaction and immunotherapy'. Minisymposium 'Mathematical models in tumor therapy' (organizers: M. Chaplain and H. Henderling). SMB-SIAM 2006, July 31 - August 5 2006. (not held for health problems) <https://tinyurl.com/v4uqgzre>

IMinInt8 A. d'Onofrio, 'Eradicationology: the mathematical art of eradicating diseases'. Minisymposium 'Differential and Integral Equations in Epidemiology and Medicine: Applications and Numerics' (organizers: H. Kuang and A. Makroglou), at HERCMA 2005, Athen, 21-24 September 2005 (Greece) <https://tinyurl.com/4ooe6w6s>

Papers published in Proceedings of International conferences

PR1 A d'Onofrio (Corr. author) and E. Pourabbas, 'Formalization of temporal thematic map contents', ACM-GIS 2001, Proceedings of the Ninth ACM International Symposium on Advances in Geographic Information Systems, Atlanta, GA, USA, November 9-10, 2001, pag 15-20, ACM Press (2001) <https://doi.org/10.1145/512161.512166>

PR2 A. d'Onofrio 'Pulse Vaccination Strategy in the SIR epidemic model in presence of Vaccine, Failures', in 'Mathematical Modelling and Computing in Biology and Medicine: proceedings of the fifth Conference of the European Society of Mathematical and Theoretical Biology 2002' V. Capasso ed., (2003) pag 450-456

PR3 A. d'Onofrio 'Prides and prejudices in the relationships between bio-mathematicians and biomedical researchers: a tale of two misbehaviors' in D.Aquilano, M. Bezzi, V. CapassoA. Micheletti (eds.), Industry Days 2003/2004 - Proceedings of the MIRIAM International Workshops in Applied Mathematics, 2005

PR4 A. Swierniak, G. Gala, A. Gandolfi and A. d'Onofrio 'Optimization of Antiangiogenic Therapy as Optimal Control Problem' in ' Proceedings of the Fourth IASTED International Conference on Biomechanics, BioMech 2006', Editor: Manuel Doblaré, Acta Press, 2006, pp 56-59, <https://www.actapress.com/PaperInfo.aspx?PaperID=28090&reason=500>

PR5 A. Swierniak, A. d'Onofrio, A. Gandolfi, Control Problems Related to Tumor Angiogenesis in Proceeding of IECON 2006 - 32nd Annual Conference on IEEE Industrial Electronics, IEEE Press (2006) 677-681, <https://doi.org/10.1109/IECON.2006.347815>

PR6 Urszula Ledzewicz, Heinz Schaettler and Alberto d'Onofrio, 'Optimal Control for Combination Therapy in Cancer' Proceedings of the IEEE Conference on Decision and Control CDC 2008, pages 1537-1542, Article number 4738880, IEEE Press (2008) <https://doi.org/10.1109/CDC.2008.4738880>

PR7 G. Caravagna (Eq. Contr. and Corr. Auth.), A. Graudenzi (Eq. Contr.), M. Antoniotti (Eq. Contr.), G. Mauri (Eq. Contr.), A. d'Onofrio (Eq. Contr.) Effects of delayed immune-response in tumor immune-system interplay. In: E. Bartocci and L. Bortolussi (eds) Proceedings of the First International Workshop on Hybrid Systems and Biology 2012, Journal: Electronic Proceedings in Theoretical Computer Science 92, 106-121 (2012) <http://eptcs.web.cse.unsw.edu.au/paper.cgi?HSB2012.8.pdf>

PR8 Caravagna G, d'Onofrio A, Mauri G (2013). NoisySim: Exact simulation of stochastic chemically reacting systems with extrinsic bounded noises (WIP). In: AA VV. DEVS 13 Proceedings of the Symposium on Theory of Modeling and Simulation - DEVS Integrative M&S Symposium , San Diego, CA; United States, 7-10 Aprile 2013. SIMULATION SERIES, vol. 45, p. 84-89 <https://dl.acm.org/doi/pdf/10.5555/2499634.2499646?accessTab=true>

Contributed Talks at International Conferences

CT1 A. d'Onofrio Mathematical Epidemiology: Going beyond Statistical Mechanics (apparently. . .). Micro and Macro Systems in Life Sciences 8 - 12 June 2015, Będlewo (Poland)

CT2 A. d'Onofrio, The interplay between extrinsic bounded noises and various levels of intrinsic noises, Lyon BioSys 2014 International Conference on Systems Biology, Lyon I University at Villeurbanne, France, 19-21 November 2014

CT3 A. d'Onofrio, Mathematical models of Stem Cells: where do we stand ?" in "Cardioconference: international workshop on Cardiac Growth and Regeneration", Rome and Viterbo (Italy) June 22-26 2014

CT4 A. d'Onofrio, The impact of side-effects on the life-time of immunization programmes, Third conference on Mathematical and computational dynamics, Bordeaux, May 31- June 4 2010)

CT5 A. d'Onofrio, Kill bill quickly: rapidly acting antitumor antiangiogenic therapies, European Conference on Mathematical and Theoretical Biology, Edinburgh June 29 - July 5 2008

CT6 A. d'Onofrio and Piero Manfredi, Information and rumours on vaccine-related side effects: modelling their influence on spreading a vaccine-controllable SIR infectious disease, European Conference on Mathematical and Theoretical Biology, Edinburgh June 29 - July 5 2008

CT7 A. d'Onofrio "A general framework for modeling tumor-immune system competition and immunotherapy: mathematical analysis and biomedical inferences", Sixth European Conference on Mathematical and Theoretical Biology - ECMTB05, Dresden (GE), July 18-22 2005, Abstract Book pag I- 360.

CT8 A. d'Onofrio and I.P.M. Tomlinson "A simple bifurcation study of a model of tumorigenesis in colon crypts" CMPD-5 (International Conference on Mathematical Population Dynamics), Trento, June 21-25 2004

CT9 A. d’Onofrio and A. Gandolfi “Tumor regression by periodic anti-angiogenic therapy” International Conference On Mathematical Biology 2003, Annual Meeting of the Society for Mathematical Biology (SMB), University of Dundee (UK) 6-9 August 2003

CT10 A.d’Onofrio: ”Pulse Vaccination Strategy in SIR Epidemic Model in presence of Vaccine Failures”, 7th European Conference on Mathematics Applied to Biology and Medicine, Milano (Italy), 2-7 July 2002, ECMTB2002 Abstract Book pag 231.

CT11 E. Pourabbas, A. d’Onofrio: ”A SIR Epidemic Model and the Parametric Resonance”, 3rd European Conference on Mathematics Applied to Biology and Medicine, Heidelberg (Germany), 6-10 October 1996. ECMTB’96.

Furthermore: Co-author of a large number of other Contributed Talks (not reported here) held by coauthors

Contributed Posters at International Conferences

Point1 A. d’Onofrio, “Interplay between extrinsic bounded noises and various levels of intrinsic noises: Simulation Algorithms and Mathematical Issues”, Lyon BioSys 2014 International Conference on Systems Biology, Lyon I University at Villeurbanne, France, 19-21 November 2014

Point2 A. d’Onofrio, “Biomathematical analysis and extension of the new class of epidemic models proposed by Satsuma et al. (2004)”, Sixth European Conference on Mathematical and Theoretical Biology - ECMTB05, Dresden (GE), July 18-22 2005, Abstract Book pag II-159

Point3 A. d’Onofrio, ” Periodically varying antiviral therapies: conditions for global stability of the virus free state” , Sixth European Conference on Mathematical and Theoretical Biology - ECMTB05, Dresden (GE), July 18-22 2005, Abstract Book pag II-199

Point4 A. d’Onofrio “Monsieur Lienard goes to the cell cycle”, Sixth European Conference on Mathematical and Theoretical Biology - ECMTB05, Dresden (GE), July 18-22 2005, Abstract Book pag II-40

Point5 A. d’Onofrio and A. Gandolfi “Tumour control by periodic anti-angiogenic therapy” CMPD (International Conference on Mathematical Population Dynamics), Trento, June 21-25 2004

Point6 S. Camporesi, A. d’Onofrio and JG McVie Targeted agents reshape cancer clinical trials, ESMO Conference 2010, Abstract published in Annals of Oncology, (2010), Supplement 8

Furthermore: Co-author of a large number of other Posters (not reported here) held by coauthors

4.2. Expertise, value creation and technology transfer

Organisation of International Conferences and International Expert Panels:

'Erice MathComp 2018 Mathematical and Computational Epidemiology of Infectious diseases' Erice (Italy), 28 August 2018 to 5 September 2018, at the 'Ettore Majorana Centre for the Diffusion of Scientific Knowledge'. Role: scientific chair and main organizer <https://tinyurl.com/3ydhxdfs>

'Erice MathComp 2015 Mathematical and Computational Epidemiology of Infectious diseases - the interplay between models and public health policies', Erice (Italy), AUG 30 - SEP 5 2015 at the 'Ettore Majorana Centre for the Diffusion of Scientific Knowledge'. Role: scientific chair and main organizer <https://erice2015.wordpress.com/directors-scientific-comittee/>

'Mathematical Oncology: new challenges for Systems Biomedicine'- Erice (Italy) September 26-30 2011 Role: scientific chair and main organizer <https://people.dm.unipi.it/erice2011/>

ASSET EU Project Workshop 'Unsolved Scientific Questions related to Pandemics and Epidemics' Lyon 23/2/2015 (organised in collaboration with M Elahi Sadaatyan and E. Vincent of Lyonbiopole)

Organization of Minisymposia in International Conferences:

V Capasso and A d'Onofrio 'Controlling epidemics: the interplay between models and public health policies' ECMTB2020 (postponed to 2021 <https://ecmtb2020.org/>)

A d'Onofrio, F Papa, A Pugliese and C Sinisgalli 'Minisymposium in Memory of Alberto Gandolfi' ECMTB2020 (postponed to 2021 <https://ecmtb2020.org/>)

U Ledzewicz and A d'Onofrio 'Analysis of mathematical models for cancer growth and treatment, Part I' Minisymposium at ECMTB-SMB 2011: 8th European Conference on Mathematical and Theoretical Biology, and Annual Meeting of The Society for Mathematical Biology, Krakow, Poland, JUN 28 - JUL 2, 2011 <https://tinyurl.com/agxy5dp5>

U Ledzewicz and A d'Onofrio 'Analysis of mathematical models for cancer growth and treatment, Part II' (see above)

U Ledzewicz and A d'Onofrio 'Analysis of mathematical models for cancer growth and treatment, Part III' (see above)

U Ledzewicz and A d'Onofrio 'Analysis of mathematical models for cancer growth and treatment, Part IV' (see above)

U Ledzewicz and A d'Onofrio 'Analysis of mathematical models for cancer growth and treatment, Part V' (see above)

P Manfredi and A d'Onofrio "Information, human behaviour and infection control - Part 1" Minisymposium at ECMTB 2011 Krakow, Poland, JUN 28 - JUL 2, 2011 <https://tinyurl.com/agxy5dp5>

P Manfredi and A d'Onofrio 'Information, human behaviour and diseases - Part 2' (see above)

A d'Onofrio and A. Gandolfi 'Angiogenesis and antiangiogenesis in tumor growth and control'. Minisymposium at 'Joint SMB-SIAM 2006 conference on Life Sciences, Raleigh USA , JUL 31 - AUG 5 2006 <https://tinyurl.com/tk78pqxi>

Member of Scientific Committees of International conferences:

Micro and Macro Systems in Life Sciences 8 - 12 JUN 2015, Bedlewo (Poland) <https://tinyurl.com/u9qq4pjm>

'Cardioconference: international workshop on Cardiac Growth and Regeneration', Rome/Viterbo (Italy) JUN 22-26 2014

'Mathways into Cancer 2' Carmona (Spain) May 27-30 2013

'MathCell 2010' Rome (Italy) DEC 14-15 2010 <https://tinyurl.com/5ywomxyy>

'Italy-UK bilateral workshop on e-Oncology', Embassy of Italy in UK, London, 27 October 2008 <https://tinyurl.com/2dxcfp3o>

Participation in scientific committees

10/2008-12/2013: Member of the Academic Council of the European School of Molecular Medicine, a leading biomedical Doctoral School.

07/2007-12/2013: Coordinator of 'Bioinformatics and Computational Biomedicine Task Force' at the European Institute of Oncology, Milan, Italy

09/2004-12/2013: Member of Scientific Council of the CIMAB (Inter-University Consortium of Mathematics in Biology, Medicine and in Environmental Sciences) committee

Expert Reviews for Research Agencies:

Agence National de la Recherche (France)

INRIA (France)

Israel Science Foundation (Israel)

Foundation for Polish Science (Poland)

Royal Society of Edinburgh (Scotland, UK)

Journal and Books Referee (very incomplete list)

Book Projects Reviewer for: Springer, Elsevier

Reviewer for Mathematical Reviews (including bio-mathematical books)

Leading Applied Mathematics and Control Engineering Journals, including: SIAM J of Appl Math, Proc London Math Soc, App Math Model, J Opt: Th & Appl, J Math Analysis and Applications, J Math Bio, Bull Math Biology , PLOS Comp Bio, J Th Biol, Discr Cont Dyn Sys Series A, Discr Cont Dyn Sys Series B, Math Biosc, Math Biosc and Eng, Math Med & Bio, Biometrical J, Nonl An: Real World Appl, IEEE Tr Biomed Eng, IEEE Tr Cont Sys Tech, IEEE Conference Series, Th Pop Bio, etc...

Leading Theoretical Physics Journals: Physl Rev Lett, Phys Rev E, Phys Biol, Physica A, Phys Lett A, Eur J Phys B, New J Phys, J Mech Stat: Th & Appl, J Mol Liq, Chaos Sol Fract, Adv Comp Sys , Int J Bif Chaos, Complexity, etc...

Leading Biomedical Journals: Nature Medicine, Canc Res, Canc Lett, BMC Med, Vaccine, Sc Rep, Science Adv (AAAS), PLOS One, Biol Direct, Proc Roy Soc B, Proc Roy Soc: Open Sc, etc

PhD Jurys Member ('Rapporteur') :

Chloé Gerin, PhD in Physics, 24 September 2012, ED518, Université Paris Diderot
<https://tinyurl.com/59sozsxk>

Giulio Caravagna, PhD in Computer Sciences, Univeristy of Pisa (Italy) 21 JUN 2011
<https://tinyurl.com/4bfoallg>

Haneen Hamam, PhD in Mathematics, Dundee University (UK) , 25 September 2017

4.2.1. Partnerships with Private Sector

After my PhD I worked 20 years in the Private Sector. Especially at International Prevention Research Institute we had contacts, contracts and partnerships with important international private firms, but I cannot disclose their names because I signed a loyalty clause. I can only safely say that I was involved especially as expert in mathematical methodologies and as expert in Infectious Diseases.

4.2.2. Societal contribution: Outreach Work towards Civil Society:

As task-leader in EU FP7 project ASSET, I worked in involving Civil Society in Pandemic Preparedness. This implied actions of dissemination to Civil Society, including <https://tinyurl.com/3qfab6c8> : events during the large public event ImmuniserLyon, a mutual learning event on Vaccines Awareness with Resident MDs, and a Portal on Best Practices <https://tinyurl.com/3k2nqrnl> . In 2019 I collaborated to writing the EU grant proposal (led by Graz University) INSTAND NGS4P on Next generation Sequencing, which was funded <https://www.instandngs4p.eu/>) . I designed the Work-Package on Communication and Dissemination, including tasks on Science in Society and MD involvements. Before italian lockdown P. Manfredi and myself wrote a strong position paper <https://tinyurl.com/5dmmygfv> on *Scienzainrete*, influential science divulgation journal online.

4.3. Teaching and/or supervision activities

4.3.1. Teaching duties

The private research institutions where I worked are not universities, so they did not include teaching in my positions descriptions. Thus I have never been teacher at University, although I was visiting professor at the Strathclyde University in Glasgow (UK). My teaching experiences are only limited to **Teaching at International Summer Schools** :

T1 Summer School on Science in Society related issues in Pandemics” National Public Health Institute, Rome, Italy, 29 May - 1 June 2017 , Minicourse on 'Vaccine hesitancy and refusal in Europe (and elsewhere)' (2 lessons)

T2 'Summer School on Science in Society related issues in Pandemics' Minicourse on 'Unsolved Scientific Questions concerning Epidemics and total Pandemics: the role of Risk communication and of Human Behaviour' National Public Health Institute, Rome, Italy, September 21-24 2015 (2 lessons)

T3 Winter Thematic School 'Present challenges of mathematics in oncology and biology of cancer : modeling and mathematical analysis'. Minicourse (90 mins) on 'Tumors: A bistable (and noisy!) tale'. Centre International des Recherches Mathematiques, Marseille University, March 19-23 2012

T4 'Mathematical Modelling of Cancer Growth and Treatment summer School - Marie Curie Network'. Course on 'Tumor-Immune system interplay and Immunotherapy' (5 lessons). Dundee (UK), August 14-29 2010

T5 'Biology and Computer Science: modelling and computing. The 30th Jacob T. Schwartz International School for scientific Research.' Course on 'Modelling of Cellular Populations' (5 lessons). Lipari (IT), July 10-17 2010

4.3.2. Supervisory duties

SU1 NOV/2011-DEC/2013: Sebastiano de Franciscis, postDoc in Biomathematics. **Publications (related to his stay at IEO):** 4 papers in International Journal (I was CA of all of them). Type of supervision: Supervision of a PostDoc . Topics: We pioneered the area of spatiotemporal bounded stochastic processes and of their application to Statistical Physics and Biology.

SU2 JAN/2008-OCT/2008: Francesca Gatti, MSc Research Student in Mathematics at Pisa University. Grade: Summa cum laude MSc Thesis: 'Delay-Induced Oscillatory Dynamics of Tumor-Immune System Interaction' (in English) Other Advisors: P. Cerrai (pro jure). Research Topics: Mathematical Oncology, Delay Differential Equations; Publications: 1 highly cited paper in Math Comp Modelling (I was CA). Official Thesis Webpage (with PDF): <https://tinyurl.com/3mfvsu8r> Type of supervision: Supervision of a MSc Research Student . Topics: We defined a family of models of the Tumor-Immune System interplay, with delayed proliferation of immune effectors. Study of stability, limit cycles and chaos

SU3 JAN/2011-OCT/2011: Sara Gattoni, MSc Research Student in Mathematics at Bologna University. Grade: Summa cum laude Thesis: 'Noisy Oncology: applications of bounded noise transitions in modelling tumor growth' (in English) Other Advisors: M. della Posta (pro jure). Research Topics: Bounded Noises in Mathematical Oncology; Publications: 1 paper in Physica A (I was CA). Official Thesis Webpage (with PDF): <https://amslaurea.unibo.it/2650/> Type of supervision: Supervision of a MSc Research Student. Summary: We proposed multistable models of tumor growth and we investigated the impact of bounded stochastic perturbations on them.

SU4 AUG/2013-SEP/2014 Dario Domingo, MSc Research Student in Mathematics at Pisa University. Grade: Summa cum laude Thesis: 'Bounded noises: new theoretical developments and applications in Pharmacokinetics' (written in English); Other Advisors: F. Flandoli (50%). Research Topics: Bounded Stochastic Processes; Publications: 2 papers in International Journals (in 1 case I was co-CA). Official Thesis Webpage (with PDF): <https://etd.adm.unipi.it/theses/available/etd-07282014-112957/> Type of supervision: Supervision of an exceptional MSc Research student who wrote a MSc Thesis very close to a PhD Thesis. Summary: Application of Stochastic Calculus to Bounded Stochastic Processes. Demonstration that a specific bounded noise can become unbounded.

SU5 FEB/2018-JUN/2018: Magdalena Ochab, PhD Student in Research Stage; *From:* Technical Silesian University (Poland); *Topic of her PhD:* 'Control Theory'; *Topic of the Research Stage:* 'Stochastic Modeling in Behavioural Epidemiology and Systems Biology' *PhD Advisor* Prof. K. Puzynsky *Publications:* ms. in submission to Appl Math Mod (I am co-CA) *Type of supervision* I introduced Magda to Behavioral Epidemiology. *Topics:* We built a stochastic model of the impact of social distancing with memory/delay during epidemic outbreaks, resulting in stochastic multiple epidemic waves.

SU6 JAN/2019-MAR/2019 PhD Student in Stage Antonella Lupica (then up to JUL/2019 she was hosted by Prof Vitaly Volpert of INRIA DRACULA) *From:* University of Messina (Italy)

Topic of her PhD: 'Mathematical Physics'; *Topic of the Research Stage* 'Spatiotemporal Vaccination Imitation Games' *PhD Advisor* Prof. A. Palumbo *Publications* :1 paper (I am CA) *Type of supervision:* I introduced Antonella to Behavioural Epidemiology; *Summary:* We built a new integrodifferential model of spatiotemporal vaccination games and investigated the occurrence of generalized traveling waves. This work, published as a long paper on *Math Biosc & Eng*, constitutes one third about of the Antonella's PhD Thesis <https://tinyurl.com/5b2k85kp> .

SU7 FEB/2019-APR/2019 PhD Student in Research Stage: Rossella Della Marca *From:* University of Parma (Italy) *Topic of her PhD:* 'Mathematical Physics'; *Topic of the Research Stage:* 'Behavioral Epidemiology'; *PhD Advisor:* Prof. M. Groppi *Publications:* 1 paper (I am co-CA) *Type of supervision:* I introduced Rossella to some topics in mathematical health sciences *Summary:* We modeled the impact of volatile public opinion on vaccine awareness campaigns, which results in a SIR model with nonlinear control. The related Optimal Control Problem is challenging, even numerically.

SU8 JAN/2019-FEB/2019 PhD Student in Research Stage Celia Garcia--Pareja *From:* Karolinska Institute, Stokholm (Sweden) *Topic of her PhD:* 'Mathematical Statistics'; *PhD Advisor* Prof. M. Bottai; *Topic of the Research Stage:* 'Impact of extrinsic noises on Cox Survival Analysis' *Summary:* During her short stage we started to investigate the impact of extrinsic noise on Cox Survival Analysis

Data

12/MARZO/2021

Luogo

LYON (FRANCIA)