CV - *Vito Michele Fazio*

PERSONAL INFORMATION *Name:* VITO MICHELE – *Family Name:* FAZIO

Institute of Translational Pharmacology (IFT),
National Research Council CNR
Headquarter: via Fosso del Cavaliere 100, ARTOV, 00133 Rome, Italy
other locations: L'Aquila; Cagliari-Pula; Palermo; Rome – CRT AO San Camillo-Forlanini

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Male | *Date of birth* 26/09/1959 | *Nationality* Italian | widower, four children

CURRENT POSITIONS

Director	Institute of Translational Pharmacology (IFT), National Research Council CNR – Rome-ARTOV, CRT AO San Camillo-Forlanini; L'Aquila; Cagliari-Pula; Palermo
Full Professor	Professor of General and Clinical Pathology (MED/04 – 06/A2), University Campus Bio-Medico of Rome, Departmental Faculty of Medicine and Surgery, Rome Italy
Director	UOS Hematological Molecular Diagnostics, Campus Bio-Medico University Hospital, Rome, Italy (on live of absence since sept. 2020)
Coordinator	Research Unit of Molecular Medicine and Biotechnologies, University Campus Bio-Medico of Rome, Departmental Faculty of Medicine and Surgery, Center for Integrated Research (CIR - Centro Integrato per la Ricerca), Rome, Italy
CTS Member	Appointed by "Assessore Regionale per la Salute" (Regional Councilor for Health) of the Regione Siciliana (Sicily regional State), in the "Commissione Tecnica per la Ricerca Sanitaria, D.A. 1173 del 19.10.2023" for the promotion, planning and development of the three-year health research program of Scientific Research in the healthcare sector of the Sicily Autonomous Region.
CdA CNCCS	Appointed by the National Research Council (CNR) in the Board of Directors (CdA) Italian National Collection of Chemical Compounds Consortium (CNCCS) Scarl (a public-private consortium created in November 2010 by the Italian National Research Council - CNR, the Istituto Superiore di Sanita' - ISS and IRBM S.p.A.)
President	Appointed by the National Research Council (CNR) and the Ministry of Economic Development (MiSE) (actually Ministry of Enterprises and Made in Italy – MIMIt), President of Panel VII, Life Sciences Sector, Sustainable Growth Fund, for the coordination and management of the evaluation of industrial research and development projects, DL "Crescita 1" (decreto-legge 22 giugno 2012, n. 83, convertito, con modificazioni, dalla legge 7 agosto 2012, n. 134) (already FIT funds).

WORK EXPERIENCE

Since July 2023	Appointed by “Assessore Regionale per la Salute” (Regional Councilor for Health) of the Regione Siciliana (Sicily regional State), in the “Commissione Tecnica per la Ricerca Sanitaria, D.A. 1173 del 19.10.2023” for the promotion, planning and development of the three-year health research programme of Scientific Research in the healthcare sector.
Since May 2022	Appointed by the National Research Council (CNR) in the Board of Directors (CdA) Italian National Collection of Chemical Compounds Consortium (CNCCS) Scarl (a public-private consortium created in November 2010 by the Italian National Research Council - CNR, the Istituto Superiore di Sanita’ - ISS and IRBM S.p.A.)
Since March 2022	Appointed by the National Research Council (CNR) and the Ministry of Economic Development (MiSE) (actually Ministry of Enterprises and Made in Italy – MIMIt), President of Panel VII, Life Sciences Sector, Sustainable Growth Fund, for the coordination and management of the evaluation of industrial research and development projects, DL "Crescita 1" (decreto-legge 22 giugno 2012, n. 83, convertito, con modificazioni, dalla legge 7 agosto 2012, n. 134) (already FIT funds).
since 2020/09/07	Director Institute of Translational Pharmacology (IFT), National Research Council of Italy (CNR) Headquarter: Area della Ricerca CNR di Roma Tor Vergata (ARTOV), Rome, Italy secondary locations: Rome – Centro Regionale Trapianti AO San Camillo-Forlanini; L’Aquila; Cagliari-Pula; Palermo.
From 2012 To 2018	Unanimously elected among the five members of the Board of Directors (CdA) of the new *High Technology District in the Human Health and Biotechnology* sector ("Distretto tecnologico pugliese salute dell’uomo e biotecnologie, società consortile a responsabilità limitata"), H-BIO Puglia , which brings together all universities, public and private research centers, large companies (including Sanofi-Aventis and Merck-Serono), SMEs, research foundations, science and technology parks, Competence Centers, production districts, business incubators, Puglia Region, engaged in the pharmaceutical, biomedical, biotechnology sectors. The District is foreseen by the MIUR call, National Operational Program for Research and Competitiveness 2007-2013, Axis I, Action The High Technology Districts and Relative Networks, Title III, Creation of New Districts. D.D. n.713 / Rec. of 29/10/2010; D.D. 190 / Ric. of 23/04/2012.
Since 2015	Full Professor of General and Clinical Pathology (MED/04 – 06/A2) University Campus Bio-Medico of Rome, Departmental Faculty of Medicine and Surgery, Rome Italy
Since 2014	Director UOS Hematological Molecular Diagnostics, Campus Bio-Medico University Hospital, Rome, Italy (on live of absence since sept. 2020)
From 2011 To 2015	Deputy Scientific Director Scientific Institute (IRCCS) for “Genetics, Innovative Therapies and Regenerative Medicine” Hospital “Casa Sollievo della Sofferenza”, Opera di San Pio da Pietrelcina, San Giovanni Rotondo (FG)
From 2011 To 2013	Technical and Scientific Committee of the “Colosseum Combinatorial Chemistry Centre for Technology S.C.a r.l. (C4T)”, spin-off of the University of Rome “Tor Vergata”.
2009	Appointed by the Austrian Science Fund (FWF) as reviewer within the framework of the FWF’s Translational Research Programme, which supports research that extends and adapts results from the applicant’s own basic research to potential applications ("oriented" research).
From 2008 To 2010	Appointed by the Executive Committee of the Campus Bio-Medico University of Rome, delegated by the Dean of the Faculty of Medicine and Surgery, delegate of the Faculty of Medicine and Surgery in the University Evaluation Unit.

From 2006 To 2009	Appointed by the Executive Committee of the University Campus Bio-Medico of Rome among the five Members of the Directive Board (Giunta della Ricerca) of the Center for Integrated Research (CIR - Centro Integrato per la Ricerca)
From 2006 To 2020	Director, Residency in Clinical Pathology (Scuola di Specializzazione in Patologia Clinica e Biochimica Clinica), University Campus Bio-Medico of Rome
From 2006 To 2015	Full Professor of Laboratory Medicine, University Campus Bio-Medico of Rome Departmental Faculty of Medicine and Surgery, Rome Italy
From 2005 To 2017	University of Bari, Italy, Degrees in Biotechnologies, courses of Applied Immunology and General Pathology (Master Degrees and BA – "lauree triennali")(MED/04).
From 2004 To 2006	Director, Residency (Specializzazione) in Microbiology and Virology, University Campus Bio-Medico of Rome, Rome, Italy.
since 2001	Director, Research Unit of Molecular Medicine and Biotechnologies University Campus Bio-Medico of Rome, Departmental Faculty of Medicine and Surgery, Interdisciplinary Center for Research, Rome Italy
From 1997 To 2006	Associate Professor of General Pathology, Faculty of Medicine and Surgery, University Campus Bio-Medico of Rome
From 1993 To 2025	Director Research Unit in Oncology Scientific Institute (IRCCS) for "Genetics, Innovative Therapies and Regenerative Medicine "Hospital "Casa Sollievo della Sofferenza", Opera di Padre Pio da Pietrelcina, San Giovanni Rotondo (Fg)
From 1992 To 2007	Catholic University SC, Faculty of Medicine, Rome, Italy, Courses of Molecular Pathology, Genetic Pathology, General Pathology, in the Master's Degree Program in Medicine and Surgery and various Schools of Specialization (Residencies).
From 1992 To 1997	Associate Professor of General Pathology, Molecular Pathology, Catholic University S.C., Rome
From 1998 To 2001	Appointed in the Technical Advisory Committee of Tecnofarmaci S.C.p.A. (Consortium of the main pharmaceutical and biotechnological industries operating in Italy, for the development of innovative pharmaceutical research) as an expert for Oncology and Biotechnology.
From 1994 To 2020	University Campus Bio-Medico of Rome, coordinator of the academic sector of General and Clinical Pathology. Courses of General Pathology (06/A2-MED/04 and MED/46)) in several degree courses of Medicine, Physiotherapy, Technician of Radiology and Radiotherapy, Nurses, Nutrition Sciences, Schools of Specialization (Residencies).
1990	Invited Visiting Scientist University of California San Francisco, Gladstone Foundation Laboratories, San Francisco, CA, USA
1989	Invited Visiting Scientist Prof. C.G. Hutchison, Department of Microbiology and Immunology, Curriculum in Genetics, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
From 1987 To 1992	Researcher, National Research Council (CNR), Institute of Experimental Medicine, Rome

Governmental Tasks:

2023	Ministry of the University and Research (MUR) – ASN, member of the Commission for the National Scientific Qualification (abilitazione) (ASN 2021-2023) of the first and second level of university professors in the Academic Sector 06/A4- Pathological Anatomy (Decreto Direttoriale n. 66, 27/01/2023).

Since March 2022	Appointed by the Ministry of Economic Development (MiSE) (actually Ministry of Enterprises and Made in Italy – MIMIt) and the National Research Council (CNR), President of Panel VII, Life Sciences Sector, Sustainable Growth Fund, for the coordination and management of the evaluation of research and development industrial projects, DL "Crescita 1" (decreto-legge 22 giugno 2012, n. 83, convertito, con modificazioni, dalla legge 7 agosto 2012, n. 134) (already FIT funds).
2021	Ministry of the University and Research (MUR) – ASN, member of the Commission for the National Scientific Qualification (abilitazione) (ASN2018-20) in the Academic Sector A06/A1 - Medical Genetics – macro-sector: Pathology and Laboratory Diagnostics 06/A (Decreto Direttoriale n. 321, 8/2/2021) in substitution of another commissioner for incompatibility.
2017	Ministry of the University and Research (MIUR) FARE Commission (Framework per l'Attrazione e il Rafforzamento delle Eccellenze per la Ricerca in Italia - Framework for Attraction and Strengthening of Research Excellence in Italy) 2016, ERC sector – LS – Life Sciences (MIUR.AOODPFSR. REGISTRO DECRETI. 0000478.06-03-2017)
From 2015 To 2017	"Commission for the National Scientific Qualification (abilitazione) (ASN2012) in the Academic Sector 06/A3 - Microbiology and Clinical Microbiology, in Execution of Jurisdictional Provisions (Decreto Direttoriale MIUR 0003225.11-12-2015).
From 2011 To 2013	Appointed by the ANVUR (National Agency for the Evaluation of Universities and Research Institutes) in the Group of Expert in Evaluation (GEV) for the sector 06 - Medicine, VQR2004-2010.
Since 2009	Appointed by the Italian Ministry of Economical Development (MiSE) in the “Albo degli Esperti” (Register of Experts) for the evaluation of competitive industrial biotechnological, pharmaceutical and biomedical projects of R&D. (Expert in the Calls: PIA Innovation, FIT, ETBS, Regional Governments, etc.)
2008	Italian Ministry of University and Research (MIUR), “Valutazione Progetti “Rientro dei Cervelli” (Evaluation Projects “Brain Gain”)
From 2007 To 2011	Appointed by the Italian Ministry of Economical Development - Unicredit MedioCredito Centrale as expert for the technological evaluation of the innovation and high technological impact of the multiannual development programs for venture capital investment ex lege 388/00 art. 103&106 of the Italian government. (Evaluation of six different projects)
From 2006 To 2014	Appointed by the Italian Ministry of University and Research (MIUR) in the Panel of 5 Experts, FAR, Major Strategic Projects - Executive Decree n.449 / Ric of 10/03/2006, Strategic Program n.2: "Relaunch of the pharmaceutical industry also through the fine chemistry of natural compounds for new diagnostic applications and new active principles", art. 5 of DM 593/00 of 08/08/2000.
2006	Appointed by Italian Ministry of University and Research (MIUR) as biotechnology expert for the evaluation of the research results involving Universities, national research institutions, private research structures, among the C.I.V.R. (Comitato di Indirizzo per la Valutazione della Ricerca; Directive Committee for the Evaluation of the Scientific Research). (Ministerial Order n° 2206 on December 16th, first Exercise of Evaluation of Italian Research for the years 2001-2003, VTR).
Since 2002	Appointed by the Italian Ministry of University and Research (MIUR) in the “Albo degli Esperti” (Register of Experts) (since 2016 REPRISE) for the evaluation of competitive industrial biotechnological and pharmaceutical projects of R&D. (evaluation of numerous industrial projects in the biomedical, pharmaceutical and biotechnological fields, in the context of the DM593/00, Calls: FAR, Regional Governments, PON, POR, art.11 Spin-Off, etc.)
1998	Appointed by the Italian Government in the “Working Group on Animal Cloning and Nuclear Transfer” for the development of the Italian guidelines, on behalf of the National Committee on Biosafety and Biotechnologies (CNBB).

EDUCATION AND TRAINING

1989/11/06	Specialization in Oncology (Italian Board in Oncology) full grades (70/70) Catholic University S.C., Faculty of Medicine and Surgery, Rome, Italy
1985-1987	Post-doc Fellowship, National Research Council Special Project Oncology, “Molecular Biology”, Institute of General Pathology, “La Sapienza” University of Rome, Rome, Italy
1985/10/30	Degree in Medicine and Surgery full grades (110/110 e lode) Catholic University S.C., Faculty of Medicine and Surgery, Rome, Italy
1984	"Course on the Molecular Genetics of Tumors: Viral and Cellular Oncogenes", Scuola Superiore di Oncologia e Scienze Biomediche, S.Margherita Ligure, Italy
1982	"Course of Genetic Engineering and its Applications in Medicine and Industry", International Institute of Genetics and Biophysics, CNR, Naples, Italy.
1981	"summer student", "Laboratory of Molecular Biology" directed by I.H. Pastan, "Gene Regulation Section" directed by B. deChrombrugge, NCI, NIH, Bethesda, Md, USA
1980; 1982	“summer student”, “Laboratory of Tumor Cell Biology”. Director dr R.C. Gallo, National Cancer Institute, NIH, Bethesda, Md, USA

WORK ACTIVITIES

Awards

2013	Cover page, Human Gene Therapy, Volume 24, number 4.
2012	Cover page, Current Molecular Medicine, Volume 12, number 5.
Since 2010	Member “Honoris Causa”, Nobile Collegio Chimico Farmaceutico – Universitas Aromatariorum Urbis (https://nobilecollegio.it/il-nobile-collegio/).
1989	Editorial, Cell, 2nd of June 1989, Volume 57, Issue 5. Max L. Birnstiel, Meinrad Busslinger “Dangerous liaisons: Spermatozoa as natural vectors for foreign DNA?”, p701.
1986	Member “Honoris Causa”, Socio Ordinario, Accademia Scientifico-Letteraria degli Incamminati (Scientific-Literary Academy of the Incamminati), Modigliana (FC), Italy

Scientific Dissemination

2025	III MEETING “LA SCIENZA PER LA PACE”. “La conoscenza anima della speranza”, 4-5 luglio 2025, Teramo Tavola Rotonda: Centri di Ricerca, segni di speranza Modera: Liborio Stuppia, Magnifico Rettore Università degli Studi “G. D’Annunzio” di Chieti-Pescara Roberto Ragazzoni, Presidente INAF Teodoro Valente, Presidente ASI Antonio Felice Uricchio, Presidente ANVUR Antonia Ricci, Direttore Generale Istituto Zooprofilattico Sperimentale delle Venezie Vito M. Fazio, Direttore Istituto di Farmacologia Traslazionale – CNR Teramo, 4 luglio 2025
2024	CNR Almanacco della Scienza, “Il genere è importante. Anche in Medicina”. Interview with VM Fazio by Rita Bugliosi on gender differences in response to drugs and in the development of diseases. (Epub 07/03/2024) https://almanacco.cnr.it/articolo/11482/il-genere-e-importante-anche-medicina
2023	VI Forum Internazionale del Gran Sasso e Partenariato Euro-Africano: V Conferenza Coordinator Session on “Ricerca e Cultura Scientifica - Research and Scientific Culture” *La scienza al servizio della società: la ricerca e la formazione per costruire un futuro sostenibile - Science in service of society: research and education to build a sustainable future*

CNR Istituto di Farmacologia Traslazionale; LNGS - Laboratori Nazionali del Gran Sasso; INAF - Osservatorio Astronomico d'Abruzzo.
Teramo, Venerdì 29 Settembre 2023

2022 Article:"Scienza e ricerca per un nuovo Rinascimento"
L'Araldo Abruzzese (local weekly newspaper)
Anno CXVIII | N. 35 | 6 novembre 2022 p.1 cover, p.6

2022 CNR, Almanacco della Scienza, Focus: Inversioni: Vaccini "informatici" e rapidi. (Epub 05/10/2022). (https://almanacco.cnr.it/articolo/5721/vaccini-informatici-e-rapidi)

2017 "Dal Metodo Scientifico alla Medicina di Precisione" "From the scientific method to the precision medicine"
UCBM Biomedical Students' Conference 2017
"Future is now: Precision Medicine",
University Campus Bio-Medico of Rome, 23-26 March

2016 "Integrare ricerca e alta formazione per sostenere lo sviluppo del Paese: esperienze e proposte" "Integrating research and advanced training to support the development of the country: experiences and proposals"
CRUI (The Conference of Italian University Rectors) – Primavera delle Università: la conoscenza libera il futuro del paese (iniziativa nazionale) [Spring of Universities: knowledge frees the country's future (national initiative)]
March 21st , University Campus Bio-Medico of Rome

2015 MEDICINA E INFORMAZIONE "Simposio Internazionale dei Docenti Universitari La Medicina, la Tecnologia e l'Etica per migliorare la salute dei pazienti": Interazione fra Genetica ed Ambiente. Lo studio genetico per terapie personalizzate. La medicina rigenerativa e le cellule staminali il futuro della medicina.
http://www.medicinaeinformazione.com/simposio-internazionale-dei-docenti-universitari---la-medicina-la-tecnologia-e-letica-per-migliorare-la-salute-dei-pazienti.html

2013 Advancement in biotechnological research in oncology.
III SESSION: Biotechnology in oncology
VI Foresight Training Course, "Biotech and Innovative Science to meet Patient Needs"
Gianni Benzi Foundation for Pharmacological Research
September 30th

2011 From invention to patent
TRAINING ACTIVITY ON PATENT MATTER IN THE BIOTECHNOLOGICAL FIELD
Gianni Benzi Foundation for Pharmacological Research.
Bari, February 14th

2003 RAI Educational – Programma Televisivo: La TV sulle Scienze.
"Explora" condotto da Luciano Onder:

Nov. 7th Genomica e PostGenomica, with prof. E. Boncinelli, prof. A. Piazza, Prof. O. Rickards, dr.ssa R. Castelnuovo, Prof. VM Fazio.

Nov. 13th Genetica, with prof. B. Dallapiccola, dr.ssa M. Frontali, dr. Dionisi Vici, prof. G. Andria, prof. VM Fazio.

ADDITIONAL INFORMATION

PUBLICATIONS

More than 165 peer-reviewed scientific publications.
ORCID ID: 0000_0002_7751_1867
https://pubmed.ncbi.nlm.nih.gov/?term=fazio+vm&sort=date&size=200

PATENTS

2015 [US 2009232837A1, issued: US 9,150,627 (B2) October 6, 2015; WO2006070432 (B1)];
Anti-Tumoral Immunogenic Peptides and Vaccine Thereof.

2008 [US 2004109849A1, issued: US 7,354,759 (B2) April 8, 2008; DE60124313 T2; WO2002/055559A1; EP 1355946 A1; PCT/IT2001/000014].
DNA Vaccines Expressing Hypervariable VH-CDR3 Idiotipic Determinants

2005 (WO/2006/008078 A1; PCT/EP2005/007709; US 20080107662 A1; EP1769076A1).
Immunogenic Peptides, Nucleic Acids Encoding the Same and Use thereof in Cancer Treatment and Diagnosis.

2002 (WO 2003031630 A1; PCT/IT2002/000646; US 2006263882)
Multi-cistronic vectors for gene transfer protocols

Books

2015 Fazio VM.
"Libertà e determinazione: dalla genetica alla epigenetica. Dalla medicina personalizzata alla medicina rigenerativa"
In "**L'umanizzazione della Medicina globalizzata**", a cura di S. Morini e S. Fileni, Collana "Nuovo Umanesimo", Libreria Editrice Vaticana, ISBN: 978-8820996284

2012 Fazio VM.
Dialogo della Fede e della Ragione sulla libertà e la perfezione attraverso l'imperfezione. Le scienze biologiche e la medicina.
In "**Il Bene della Cultura**" "Esperienze di collaborazione e comunione culturale alla luce del Concilio Vaticano II", a cura di E. Bettini, Minerva Edizioni, ISBN: 978-8873815136

2012 De Robertis M, Fazio VM, and Signori E.
Murine Models of Sporadic and Inflammation-Related Colon Carcinogenesis with Particular Focus on the AOM/DSS Chemically Induced Colorectal Cancer Model, Animal Models.
Chapter 1:1-45 in: C**ancer Research and Human Disease: Applications, Outcomes and Controversies**,
Sean A. Murray (Ed), Nova Science Publishers, Inc. New York, USA. ISBN: 978-1-62417-587-9.
https://www.novapublishers.com/catalog/product_info.php?products_id=35140

2011 Pieranna Chiarella, Vito Michele Fazio and Emanuela Signori.
DNA Vaccination by Electrogene Transfer. Chapter 8:169-198
in: **Non-Viral Gene Therapy**.
Xu-bo Yuan (Ed.). InTech d.o.o, Croatia. ISBN: 978-953-307-538-9.
http://www.intechopen.com/articles/show/title/dna-vaccination-by-electrogene-transfer

2010 Pieranna Chiarella, Emanuela Massi, Mariangela De Robertis, Vito M. Fazio and Emanuela Signori.
Strategies for Effective Naked-DNA Vaccination Against Infectious Diseases
In "**Frontiers in Anti-infective Drug**"; Atta-ur-Rahman and M. Iqbal Choudhary Editors; BENTHAM eBOOKS; ISBN: 978-1-60805-158-8

2007 Fazio V.M.
Elogio della Libertà della Perfezione
In "**La Carità Intellettuale**" Casa Editrice Vaticana, L. Leuzzi ed., 43-56, ISBN: 9788820979324

2006 Fazio V.M., Parrella P.
La genetica del carcinoma mammario.
In "**Neoplasie della mammella** " SEE Editrice Firenze, EV Cosmi, JA Pinotti ed.s,, cap 4: 105-121
ISBN: 9788884650153

2001 Pizzimenti S., Rinaldi M., Fazio V.M. and Barrera G.
4-hydroxynonenal: an endogenous signal for cell proliferation and differentiation.
Current Topics in Biochemical Research, 4: 71-79

1998 Rinaldi, M., Ciafrè, S.A., Parrella, P., Signori, E., Farace, M.G., Saglio, G., and Fazio, V.M.
Strategies to elicit anti-idiotypic immune response in B-lymphoma patients: peptide and genetic immunization.
In **Gene Therapy of Cancer**, ed. by P. Walden, U. Trefzer, W. Sterry and F. Farzaneh, Adv Exp Med Biol**,** Plenum Publishing Corp**,** 451: 323-330
ISBN: 0-360-46027-0

1998 Fazio, V.M., Signori E., Lombardi L., Delfino S., Rinaldi M.
Una nuova frontiera per la dermatologia: la cute come bersaglio per il trasferimento genico e la terapia genica somatica
In: "**Attualità in Tema di Dermatologia Oncologica**", Massa Editore, p. 308-315

1997 Notarangelo, G., Latino, R., Gasparini, P., Zelante, L., Fazio, V.M., Rinaldi, M.
Efficient transfection of adherent cells using cell suspensions.
Focus, 19 (3): 58-59

1996 Fazio, V.M., Tonon, G. and Tagliabue, A.
Vaccini a DNA: l'immunizzazione genetica
Biotec, 5:20-28

1996 Barrera, G., Pizzimenti, S., Barbiero, G., Muraca, R., Bonelli, G., Baccino, F.M., *Fazio, V.M.* and Dianzani, M.U.
4-hydroxynonenal action on cell cycle and differentiation of HL-60 cells.
In "**Carcinogenesis as a process**, 5". Baccino, F.M. et al. ed.s, Edi-Ermes Milano, p. 38-40

1994 *Fazio, V.M.,* Ciafrè, S.A., Rinaldi, M., Seripa, D., Bisceglia, L., Farace M.G. and Gasparini P.
Study on the feasibility of phosphorothioate modification for the construction and expression of nuclease-resistant genes.
In "**Advances in Gene Technology: Molecular Biology of Human Genetic Disease. Gene Therapy**." W.J. Whelan et al. ed.s, IRL press at Oxford University press, p. 61

1994 *Fazio, V.M.,* Rinaldi, M., Ciafrè, S.A., Seripa, D., Fazio, S. and Farace M.G.
In vivo expression of recombinant proteins by direct intramuscular gene transfer.
In "**Advances in Gene Technology: Molecular Biology of Human Genetic Disease. Gene Therapy**." W.J. Whelan et al. ed.s, IRL press at Oxford University press, p. 60

1993 *Fazio,V.M.*, Barrera, G., Muraca,R., Rinaldi,M., Ciafrè, S., Lazzari, M. and Farace, M.G.
Differentiating agents and cancer therapy. Role of cellular lipid peroxidation and its product 4-hydroxynonenal in the control of cell proliferation and differentiation.
In "**Combination Therapies 2**", Goldstein, A.L. and Garaci, E., ed.s, New York: Plenum Press, pp. 105-114, ISBN: 978-1-4615-2964-4

1991 Barrera, G., Biasi, F., *Fazio, V.M.*, Paradisi, L., Dianzani, M.U.
Repeated treatments with low HNE concentration affect K562 cell proliferation.
In "**Chemical Carcinogenesis 2**", Columbano, A., et al., eds., New York: Plenum Press, 337-342..
ISBN: 978-1-4615-3694-9

1990 Ravagnan, G., D'Ambrosio, E., Carloni, G., Calissano, P., *Fazio, V.M.*, Grimaldi, M.
L'ingegneria biologica scienza del Duemila.
In **Media Duemila** 71:134-139

1987 *Fazio, V.M.*, Manzari, V., Faggioni, A., Marchei, P., Lazzari, M., Redler, A., Antonozzi, I., and Frati, L.
Genomic Markers of Tumors.
In "**Human Tumor Markers, Biology and Clinical Application**", Cimino F., Birkmaer G.D., Pimentel E., Klavins J.V., Salvatore F., eds., Walter de Gruyter, Berlin-New York, 151-168

1985 *Fazio, V.M.,* Martinotti, S., Frati, L., and Manzari, V.
Genetic evidences of HTLV involvement in Acute T- cell Leukemia and AIDS.
In "**From Oncogenes to Tumor Antigenes**", Giraldo G. et al. eds, Elsevier Science Publishers B.V., pp. 83-93.

ISBN: 044480672-5

1985 *Fazio, V.M.,* Manzari, V., Frati, L., Franchini, G., Wong-Staal, F., and Gallo, R.C.
High level transcription of a human gene in HTLV-I positive T-cells: cDNA cloning and characterization.
In "**Genetic and Phenotypic Markers of Tumors**", Aaronson S., Frati L. and Verna R. eds., Plenum Publishing Corp., pp. 345-355.
ISBN: 030641817-7

1984 *Fazio, V.M.,* Martinotti, S., Manzari, V., Zani, M., and Frati, L.
Mechanisms of c-onc activation.
In **Med. Biol. Envir**., 12: 589-591

1984 Manzari, V., *Fazio, V.M*., Gradilone, A., Barillari, G., and Frati, L.
Diffusion in Italy of Human T-cell Leukemia Virus I (HTLV-I), Molecular Epidemiology.
In "**New Trends in Experimental Hematology**", Peschle C and Rizzoli C eds., Ares Serono Symposia, pp. 262-266

1984 Martinotti, S., *Fazio, V.M.,* Zani, M., Oppido, P.A., Manzari, V., and Frati, L.
Molecular organization of c-myc c-sis onc-gene in brain tumors: an epidemiological study.
In "**New Trends in Experimental Hematology**", Peschle C and Rizzoli C eds., Ares Serono Symposia, pp. 460-465

SPECIFIC SKILLS

MY SCIENTIFIC VISION

I would like to introduce my scientific vision to evidence how it relates to the main topics of the Call. I took the liberty of reporting below quotes from important protagonists of the modern scientific discussion to humbly place my vision within the ongoing discussion and the innovation trends at the international level.

Science is dealing with complexity and many of the fundamental deterministic points on which knowledge has developed in the history of humanity have come into a vivid discussion. Concepts such as *Relativity* and *Chance* are populating science, including mathematics-linked natural sciences.

Klaus Mainzer, a German philosopher and scientist, in his renowned work "*Thinking in Complexity"* has focused his attention on complexity as the main problem of the last century*: «Complexity determines the spirit of twenty-first century science. The expansion of the universe, the evolution of life, and the globalization of human economies and societies all involve phase transitions of complex dynamical systems. … The theory of nonlinear complex systems has become a successful problem-solving approach in the natural sciences – from laser physics, quantum chaos, and meteorology to molecular modelling in chemistry and computer-assisted simulations of cellular growth in biology. On the other hand, the social sciences are recognizing that the main problems of mankind are global, complex, nonlinear, and often random, too. Local changes in the ecological, economic, or political system can cause a global crisis. Linear thinking and the belief that the whole is only the sum of its parts are evidently obsolete*». The 2020-22 global pandemics strongly reaffirms these interconnections also on human health, medicine and the environment (One Health).

In the course of XIX and XX centuries the reductionist approach has been extraordinarily successful at elucidating biological mechanisms. The picture becomes complicated when attempting to find linear causality at the cell or the entire organism level, this latter effort becoming even more complex when applied to human diseases. As a such, biological life is in constant evolution and what we once thought as stable, e.g. the individual genetic information, is constantly evolving throughout the life of an organism. This can be traced back to the epigenetic program of stemness/differentiation, or to the uninterrupted transformation in the senescent stem cells that allowing the continuous turn-over and reassembly of all tissues and organs since conception. Going to "one level up" in complexity, it is noted that the single organism is immersed in the environment which deeply influences its continuous biological development. These interactions depend to such an extent on individual genetics and natural history that the very concept of health and disease must be referred to the single individual in the context of the environment in which he/she dynamically lives. Not only the chemical, physical and biochemical environment, but also the psychological and social background, e.g. maternal care and childhood socioeconomic status, influence biological life from conception throughout adult life, determining health and disease.

Hans Jonas in his "The Phenomenon of Life. Toward Philosophical Biology" depicts an intriguing synthesis of the developmentally evolving nature of "life": «*viewed from the fixed identities of the changing material contents, as the inventory of each moment would record them, the living form too is only a region of local and temporal transit in their own movements, its apparent unity a passing, configurative state of their multiplicity. But viewed from the dynamic identity of the living form, the reverse holds: the changing material contents are states of its enduring identity, their multiplicity marking the range of its effective unity. In fact, instead of saying that the living form is a region of transit for matter, it would be truer to say that the material contents in their succession are phases of transit for the self-continuation of the form. (p.80) … In the precarious metabolic continuity of organic form, with its perpetual turnover of constituents, no inert substratum, no single "path" and no "bundle" of parallel paths of cotemporaneous members, is available as referent for external identity. Internal identity of the whole, transcending the collective one of the present and vanishing substratum, must span the shifting succession. Such internal identity is implicit in the adventure of form and is spontaneously assumed on its external, morphological evidence which alone is open to inspection (p.82)*».

Thus, from a biological point of view, the problem is how to integrate the evolving nature of life with the multilevel signaling of cells, tissues, organs, in time and space, to understand the flow and role of each process and pathway, in the context of the whole organism. Another philosopher of science who has dedicated his work to complexity, Jürgen Mittelstraß, adds a clarifying observation to the concept: «*As to the distinction between complexity and complicatedness: The greater the number of objects and relations of a system, the greater its complexity. Complicatedness depends on the inhomogeneity of the object area. There can thus be systems of high complexity but small complicatedness (e.g.: organic molecules composed of numerous elements of few different kinds) whereas high complicatedness as a rule leads to complexity (for*

example: organisms). So far, as the reduction of complexity is done for explanatory intents, and achieved especially by model building. Models serve to simplify complex structures and to visualize abstract structures." (Jürgen Mittelstrass, Complexity, Reductionism, and Holism in Science and Philosophy of Science)

Models are extremely important in biology and medicine because they can represent the fundamental basis to develop disease biomarkers and identifying specific molecular targets for drugs. The exciting revolution of targeted therapeutics in oncology in the first two decades of 2000 with the significant improvement in life expectancy and quality of life is directly linked to the so-called "Vogelstein model of carcinogenesis". But we still cannot cure cancer. What we define as "targeted" is only partially targeted or is just one out of many targets that are involved in the evolution and adaptation of the tumor. Thus, newer models are being introduced to include the behavior of tumor stem-like cells, the complex signaling network between tumor microenvironment and tumor cells, the clonal evolution of the tumor cell in its individual natural history, the pre-metastatic niche formation, and so on. Increasingly "complicated" models that are capable of including more and more inhomogeneous variables are being introduced into medicine and biology leading to a revolution similar to that of quantum mechanics and the theory of relativity. Newly revised concepts as, for example, "the evolutionary contexts", "the emergent factors", the "esposomes" and the "signaliomes" are changing our view of the biological system and the life. This is the landscape of my recent research direction aimed at studying the intratumor heterogeneity (ITH) from the cellular, genetic, epigenetic and metabolic points of view, in connection with the complex signaling between tumor, tumor microenvironment and the organism. This approach has unveiled new mechanisms of controlling stemness and differentiation in specific tumors and to redirect them to bypassing targeted therapies.

The biomedical sciences therefore require not only deeper knowledge of mechanisms and relationships, toward higher levels of integration and complexity, but also the parallel development of the technology to diagnose and cure.

Last but not least, it is of paramount importance developing the ability to take care of the human persons together with the nature that surrounds them. Medicine, pharmacology, pharmaceutics, diagnostics, need to manage big data. Modern science needs interdisciplinary approaches, demanding a big research network, a new way of organizing research institutions and research groups, a new idea of science and technology that brings together different disciplines, approaches, instrumentations.

MAIN RESEARCH LINES

YEARS	MAIN TOPICS
1984 - 1996	Molecular Pathology, Carcinogenesis, Human Retroviruses, Oncogenes, Differentiation and Proliferation Cellular Programs in Physiology and Carcinogenesis.
1989 - 1992	Biotechnology, Naked DNA Transfer, Sperm Mediated Gene Transfer, Transgenic Animals.
1994 - 2018	Biotechnology, Naked DNA Transfer, Gene Therapy, Genetic Vaccination, Technology Development, In-Utero Gene Therapy.
1998 – 2018 ongoing	Biotechnology, Genetic Vaccination, Gene Therapy, Anti-Tumor Vaccination, Preclinical Models.
1998 - 2010	Molecular Pathology, Genetic Biomarkers, Individual Gene Variants, Multifactorial Diseases.
2004 - ongoing	Molecular Pathology, Epigenetics Biomarkers, Epigenetic Programming, Differentiation and Proliferation Cellular Programs in Physiology and Pathogenesis.
1998 - ongoing	Molecular Pathology, Genetic Biomarkers, Intra- Inter- Tumor- Heterogeneity,
2017 - ongoing	Molecular Pathology, Targeted Therapy, Intra-Tumor Heterogeneity, Mechanisms of Resistance to Therapy, Genetic/Epigenetic Biomarkers

2021 - ongoing	Biotechnology, Molecular Pathology, Targeted Therapy, Intra-Tumor Heterogeneity, Mechanisms of Resistance to Therapy, 3D Patient-Derived Organoids and Spheroids, Primary and Metastatic Tumors PDO Models

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