Nicoletta Sacchi, Full Professor of Molecular Biology, University of Milan

Education

Dr. Nicoletta Sacchi, received a Doctoral Degree in Biological Sciences (magna cum laude) from the University of Milan (Unimi) with a thesis dissertation in Genetics (Lab of Prof. Giovanni Magni). She performed postdoctoral training (1976-1984) in different fields of genetics and biology including: inborn errors of metabolism, at the Erasmus University of Rotterdam (Lab of Prof. Hans. Galjaard), immunogenetics at the Basel Institute of Immunology (Lab of Prof. Georges Kohler), and cancer genetics at the USUHS Medical School, Bethesda, USA (Lab Prof. Fred Bollum).

Academic Appointments

She was Fogarty Scientist at the National Cancer Institute (NIH), USA (1984-1991)where she investigated whether in addition to direct derangement of oncogenes, also oncogene position effects and dosage effects play a role in leukemogenesis. To this end, she used as models specific chromosome regions (e.g. the 11q23 and 21q22) involved both in many nonrandom leukemia chromosome rearrangements and associated with genetic disorders predisposing to cancer (e.g. ataxia telangiectasia and Down syndrome). Her research entailed accurate quantitative analysis of gene transcription in rare and scanty patients' samples at a time when there was no qPCR. To this end she developed in collaboration with a colleague, Dr. Piotr Chomczynski, the rapid and efficient method known as the "Single Step Method for RNA isolation" (Anal Biochem, 1987; Nature Protocols, 2006). Based on the principle that the acidity of the medium enables the RNA separation from DNA, the single-step method greatly advanced RNA-based technologies and, in the recent years, the isolation of non-coding RNAs. The original paper describing this method, which was, and still is, widely used around the world, ranked #5 among the 100 most cited papers. http://www.nature.com/news/the-top-100-papers-1.16224.

As an Associate Professor at the University of Milan (Unimi) (1992-2007) she was part of an international group of scientists collaborating on the physical and linkage map of chromosome 21, the smallest human autosome, and used positional cloning to identify genes on chromosome 21 involved in Core Binding Factor Leukemia (CBFL), Alzheimer disease, and Down syndrome The identification of the molecular defect of t(8;21) CBF-AML leukemia using the genomic strategy of positional cloning led to the development of a patented method for detecting and monitoring residual minimal disease in leukemia patients http://www.google.com/patents/US5858663. In collaborations with the Sydney Kimmel Comprehensive Cancer Center at Johns Hopkins (1998-2002), she focused her efforts on epigenetic mechanisms of transcriptional regulation in breast cancer (DNA and histone modifications), and pioneered epigenetics therapy.

In 2003 to expand her cancer interest she established a collaboration with RPCI, a Comprehensive Cancer Center in NY State to expand several area of research including: i) the role of a novel family of epigenetic repressors (MTGs), that can act as oncogenes or tumor suppressor depending on the cell context; ii)) the discovery of an autonomous mechanism of cell fate whose fulcrum is the Retinoic Acid Receptor alpha (RARA) in its dual genomic and

non-genomic capacity. Apparently, RARA disparate functions enable physiological Retinoic Acid (the bioactive derivative of Vitamin A) to exert in a spatiotemporal fashion disparate (pro-survival and growth inhibitory/ pro-apoptotic) actions to accomplish the morphogenesis of mammary ductal structures; iii) chronobiology of breast cancer.

Internships/ sabbatical stages (selection)

1975	Karolinska Institute, Stockolm, Sweden, Laboratory of Prof. Torbjörn Caspersson (Chromosome banding)
1978	Gaslini Children Hospital, Genoa, Laboratory of Prof. Paolo Durand (Lysosomal Storage Disorders)
1981	Basel Institute of Immunology, Switzerland, Laboratory of Prof. G.Kohler (Development of Monoclonal antibodies)
1987	Hôpital Necker – Enfants Malades, Paris (Down syndrome and chromosome 21)
1991	ICRF Medical Oncology Laboratory, St. Bartholomew's Hospital, London (Genomics of chromosome 21
1996	Erasmus University, Clinical Genetics Department, Rotterdam, NL (AML1/RUNX1 and leukemia with chromosome 21 rearrangements)

Honors (selection)

Soroptimist International: Award for Young Women in Science *(*1976*)*
AIRC: Young Scientist Award (1983)
Giannina Gaslini Children's Hospital (Genoa, Italy): Medal for "Development of genomics technology for the diagnosis and cure of childhood disease" (1989)
Royal College of Physicians (England): Award for Advancement in the aetiology of leukaemia" (1991)
Dompe' BIOTEC (Italy): Special Mention for "Development of molecular tools for leukemia treatment" (1998)
Institute for Scientific Information (ISI, USA): "Highly Cited Researcher Award in the Category of Biology and Biochemistry" (2003)
Presidential Honor, Category, Commander, Order of Merit of the Italian Republic for "Significant contributions to the advancement of science" (2007)
http://www.quirinale.it/elementi/DettaglioOnorificenze.aspx?decorato=222034

Study Sections (selection*)*

Ad hoc reviewer AIRC (1998-2004); *Ad hoc* reviewer Susan Komen Foundation (2006-2008); *Ad hoc* reviewer Chemo -Dietary Study Section NCI-NIH (2007 and 2009); Panelist of Genetics, Genomics and System Biology, European Research Council (ERC) (2008)*; Ad hoc* reviewer for RPCI Alliance *(*2012, 2013; 2015*); Ad hoc* reviewer for the Italian Department of Health (2015)

Organization of Scientific Meetings (selection):

Annual Giuseppe Bigi Memorial Lecture in Hematological Oncology, University of Milan (2005-date); Organizer Workshop Epigenetics and Cancer, University of Milan (1996 and 1998) - Organizer, EMBO Workshop "Chromosome 21: Impact of Genome Technology in Human Genetics" Genova, (Italy) 1989 - Co-organizer, Symposium "Normal and Neoplastic Blood Cells: From Genes to Therapy, Rome, 1986 - Co-organizer, International Course on Human

Preleukemia, Rome 1985; Ettore Majorana Foundation and Centre for Scientific Culture, International Course of Prenatal Diagnosis (Erice, 1978)

Editorial Boards/ Academic Editor

Cancer Genetics and Cytogenetics, Elsevier (2000-2010)
International Journal of Oncology, Spandidos Publications (2007-date)
Research Biochemistry International Hindawi Publishing Corporation (2007-date)
Journal of Cancer Epidemiology, Hindawi Publishing Corporation (2007-date)
Cell Communications Insights, Libertas Academica (2008-date)
Biology, MDPI AG, Basel (2011-date)
Peer Journal (2012-date)
International Journal Molecular Sciences, Cancer Epigenetics (2016-date)

Scientific Boards

AGB Society of Hematological Oncology, Italy (2005-date)

Consultant activity and Patents

Genomics consultant at Life Technologies, Molecular Biology/Genomics Division, Rockville, MD (1991-97)

Patents:

Method for the rapid and ultrasensitive detection of leukemic cells (Inventors: P.Nisson and **N. Sacchi**, USA, 1996, Assignee: Life Technologies)

Aberrantly methylated genes as markers of breast malignancy (Inventors: S. Sukumar, E. Evron, W. C. Dooley, **N.Sacchi**, N.Davidson, M.J. Fackler, USA, 2002-2012 Assignee: The Johns Hopkins University)

Professional Memberships

American Association of Human Genetics, ASHG(1986-date)
American Association of Cancer Research, AACR(1990-date)
American Society of Cell Biology, ASCB (1998-date)
Association of Highly Cited Italian Scientists (2003-date)
Epigenetics Society International (2005-date)
Human Proteome Organization (HUPO) (2013-date)
National Breast Cancer Coalition (NBCC) (2015-date)
Coalition Against Childhood Cancer (2016-date)

List of Publications and Meeting Abstracts in scientific journals at my NCBI

http://www.ncbi.nlm.nih.gov/sites/myncbi/1F9zco8phtiQD/bibliography/47376344/public/?sort=date&direction=descending

Funding (2002-date)

No grant number assigned
Breast Cancer Prevention/Alliance Foundation Sacchi (Role: PI) 1/01//2006 - 3/31/2019
Factors and molecular mechanism of breast cancer initiation

NCI-NIH P50CA159981
Ovarian Cancer Spore DRP award Sacchi (Role: PI) 7/01/2015 – 3/31/2019
Testing Pol I inhibitor drugs to treat MYC-overexpressing ovarian cancer

NCI-NIH 5R01CA127614 Sacchi (Role:PI) 3/01/2008 - 12/31/2016
Epigenetics of the retinoic acid paradox

Alliance Foundation Sacchi (Role:PI) 1/01/2013 – 30/06/2016
Non-coding RNAs in the pathogenesis of CBF alpha leukemia

University of Rochester/Alliance Foundation Sacchi (Role: PI) 5/1/2012 – 10/31/2013
RUNX1-regulated network of coding and non-coding RNAs in normal and malignant hematopoiesis

Friends Breast Cancer Foundation Sacchi (Role:PI) 5/1/2010 – 12/31/2012
Identification of unique breast pre-malignancy signatures

Breast Cancer Coalition of Rochester Sacchi (Role PI) 1/ 1/2008 --12/31/2008
Profiling of Breast Pre-Malignancies

PRIN 2007 Sacchi (Role PI) 2008-2010
Identification of retinoic acid receptors mediating tumor cell growth promotion

DOD CONCEPT Sacchi (Role PI) 09/01/2006-08/30/2008
Title: “Disruption of the circadian clock in early breast tumorigenesis”

DOD IDEA Sacchi (Role PI) 4/1/2002 - 5/30/2008
Title: “Modulation of Breast Tumor Cell Response to Retinoids by Histone Deacetylase Inhibitors”