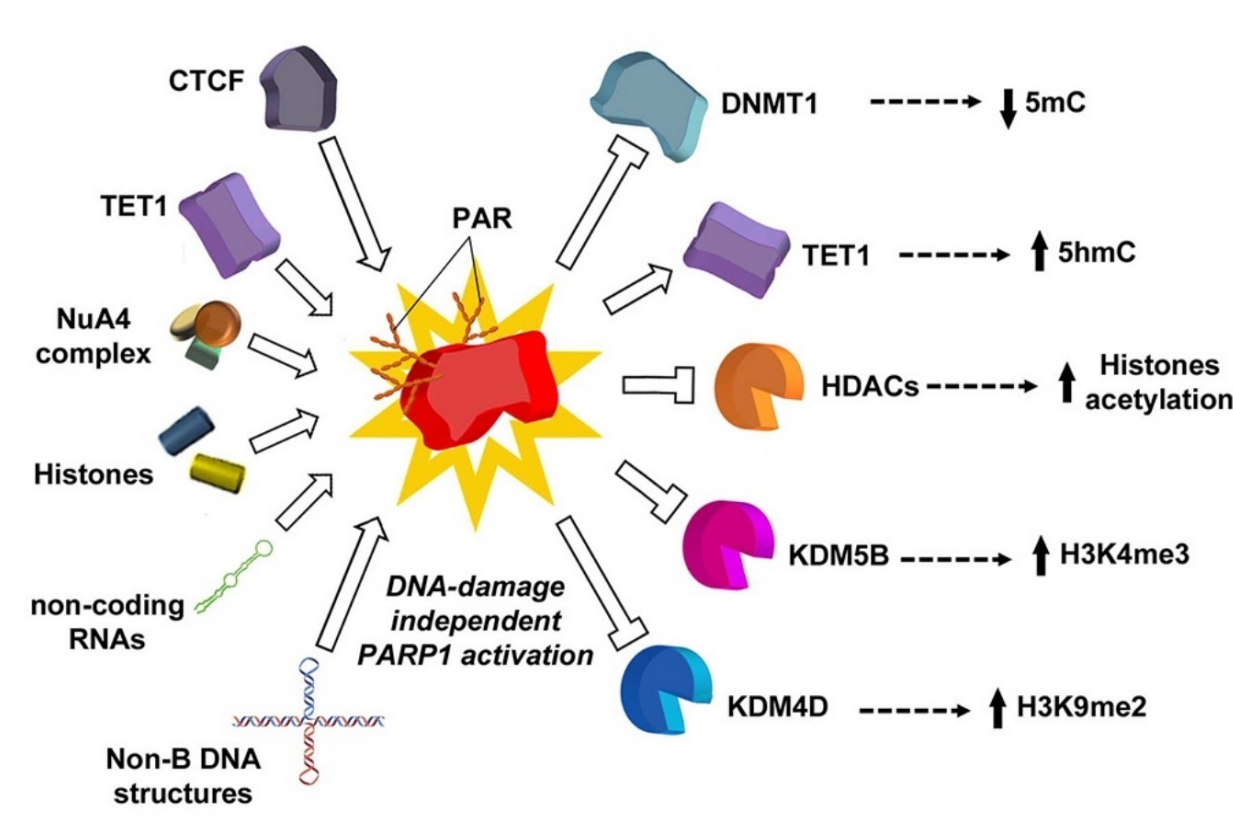
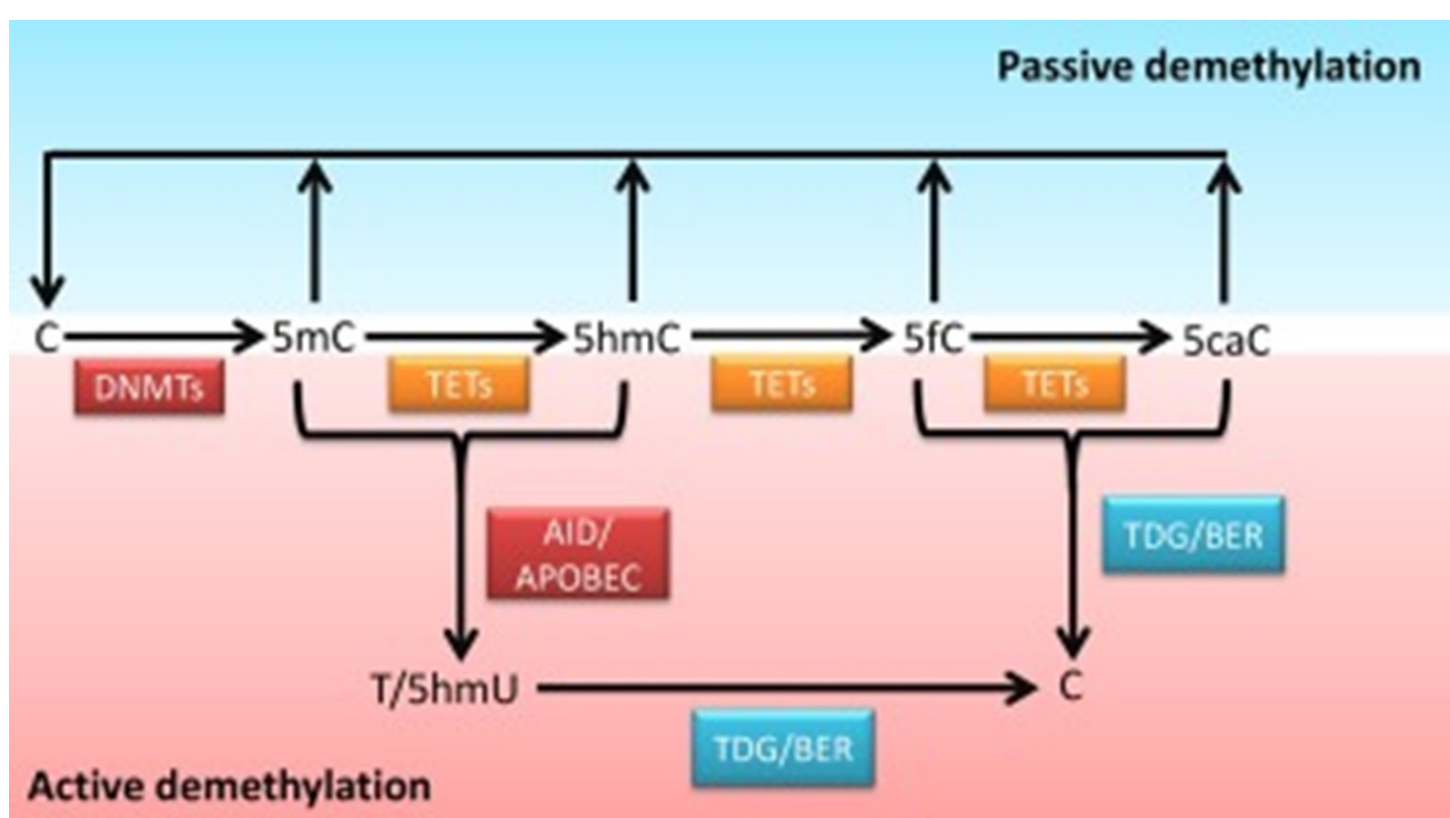


EPIGENETICS



General description of the activities

The Epigenetics Laboratory studies the epigenetic modifications that alter the structure of chromatin, focusing attention on the mechanisms through which DNA methylation profiles are maintained in the cells of different tissues. Among the different mechanisms, the PARylation process seems to be also involved in some epigenetic regulatory pathways (see figure).

Since epigenetic deregulation is at the basis of several pathological conditions - such as diabetes, cancer, neurodegenerative diseases - the recognition of epigenetic alterations associated with disease has clinical relevance in their diagnosis and therapy, especially considering the need for constant treatment more targeted and effective, the objective of so-called "precision medicine"

Role	Name	Position	E-mail	Publications	Keywords
Lab head	Prof. Anna Reale	Associate professor	anna.reale@uniroma1.it	https://pubmed.ncbi.nlm.nih.gov/?term=Reale+Anna&sort=date	Epigenetics DNA methylation PARylation DNA damage Aging
Lab members	Prof. Michele Zampieri	Associate Professor	michele.zampieri@uniroma1.it	https://pubmed.ncbi.nlm.nih.gov/?term=michele+zampieri&sort=pubdate	DNA methylation Active DNA demethylation Aging PARylation
Lab members	Dr. Giuseppe Zardo	Researcher	giuseppe.zardo@uniroma1.it	https://pubmed.ncbi.nlm.nih.gov/?term=Zardo+G&sort=date	DNA methylation Histone methylases and demethylases sncRNAs Polycomb/Trythorax proteins Leukemia
Lab members	Dr. Katsiaryna Karpach	Research fellow	katsiaryna.karpach@uniroma1.it	https://pubmed.ncbi.nlm.nih.gov/?term=Karpach+K&sort=date	DNA methylation Oxidative stress Diabetes type 2

Previous research and Current research

PARYlation and Epigenetic Control: research on how PARYlation influences the epigenetic regulation of gene transcription with a specific focus on DNA methylation and active demethylation processes

Role of transcription factors CTCF and BORIS/CTCF in cancer: Investigation of the role of transcription factors CTCF and BORIS/CTCF in driving aberrant epigenetic regulation and Notch3 expression and activity in T-cell acute lymphoblastic leukemia (T-ALL)

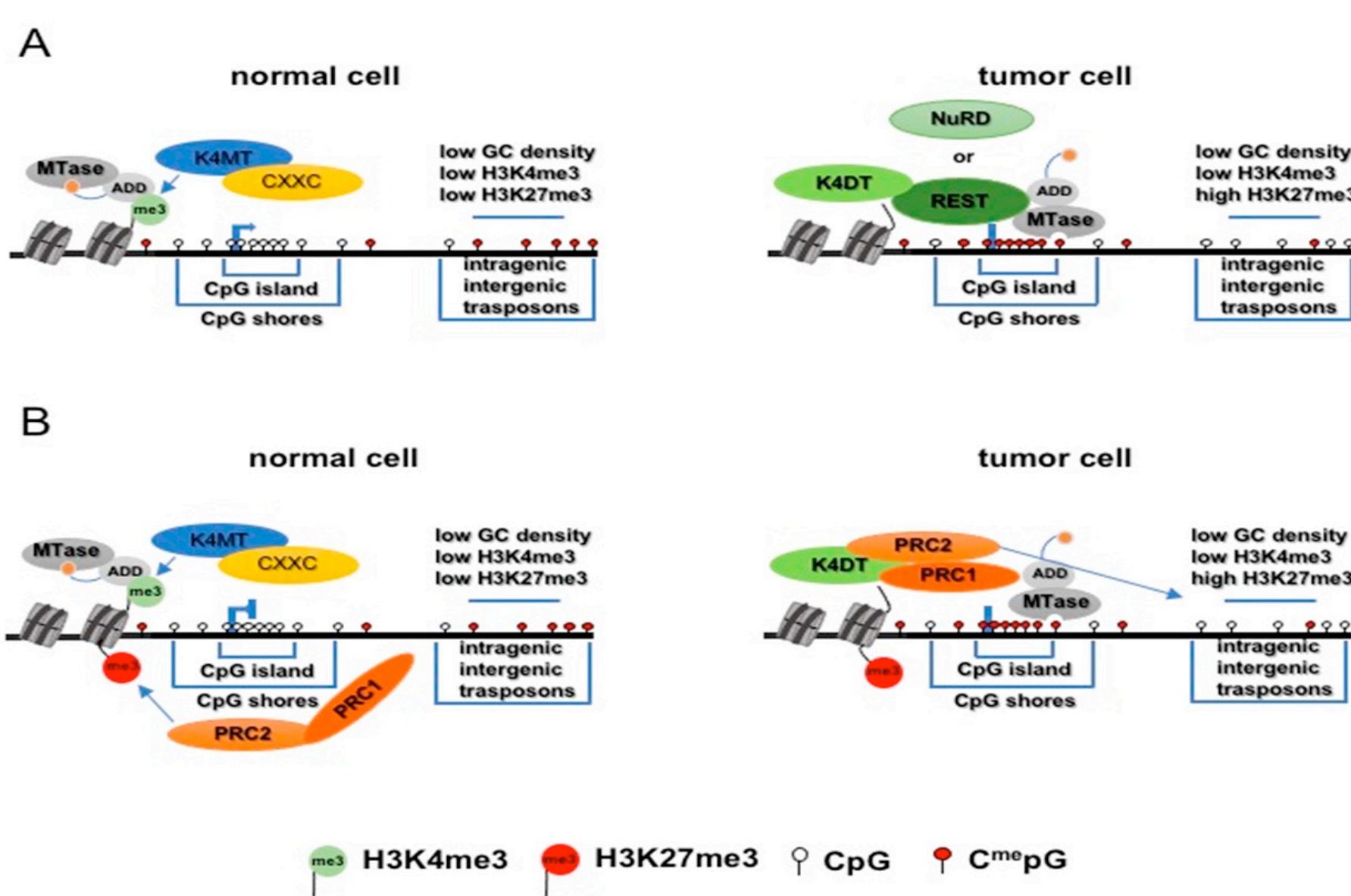
DNA methylation, aging and progeroid diseases: exploration of the relationship between genomic DNA methylation profile, age, health, and dietary habits in a large population study, including offspring of nonagenarians and adults with Down syndrome.

PARYlation and DNA Methylation: study on the impact of PARYlation on DNA methylation processes in complex diseases like type 2 diabetes mellitus and Multiple Sclerosis

Zardo Giuseppe

Our research is focused on the mechanisms determining the deposition of the correct epigenetic signals during normal cellular differentiation and their alterations in the onset and progression of solid and liquid tumours, with a specific interest in Acute Myeloid Leukemia epigenetics (see figure).

Combined effects of DNA methylation, histone modifications and Polycomb/Trythorax proteins on tumor onset



Selected Publications

- PAR level mediates the link between ROS and inflammatory response in patients with type 2 diabetes mellitus. **Zampieri M, Karpach K, Salerno G, Raguzzini A, Barchetta I, Cimini FA, Dule S, De Matteis G, Zardo G, Borro M, Peluso I, Cavallo MG, Reale A. Redox Biology**, Volume 75, 2024, 103243, ISSN 2213-2317
- YY1 Knockdown Relieves the Differentiation Block and Restores Apoptosis in AML Cells. Noguera NI, Travaglini S, Scalea S, Catalanotto C, **Reale A, Zampieri M, Zaza A, Ricciardi MR, Angelini DF, Tafuri A, Ottone T, Voso MT, Zardo G. Cancers** (Basel). 2023 Aug 7;15(15):4010. doi:10.3390/cancers15154010.PMID: 37568827
- Counteracting aged DNA methylation states to combat ageing and age-related diseases. **Reale A, Tagliatesta S, Zardo G, Zampieri M. Mech Ageing Dev.** 2022 Sep;206:111695. doi:10.1016/j.mad.2022.111695. Epub 2022 Jun 24. PMID: 35760211.
- Increased PARYlation impacts the DNA methylation process in type 2 diabetes mellitus. **Zampieri M, Bacalini MG, Barchetta I, Scalea S, Cimini FA, Bertocchini L, Tagliatesta S, De Matteis G, Zardo G, Cavallo MG, Reale A. Clin Epigenetics** 2021 May 17;13(1):114. doi: 10.1186/s13148-021-01099-1. PMID: 34001206.
- Ageing affects subtelomeric DNA methylation in blood cells from a large European population enrolled in the MARK-AGE study. **Bacalini MG, Reale A, Malavolta M, Ciccarone F, Moreno-Villanueva M, Dollé MET, Jansen E, Grune T, Gonos ES, Schön C, Bernhardt J, Grubeck-Loebenstein B, Sikora E, Toussaint O, Debacq-Chainiaux F, Capri M, Hervonen A, Hurme M, Slagboom PE, Breusing N, Aversano V, Tagliatesta S, Franceschi C, Blasco MA, Bürkle A, Caiafa P, **Zampieri M. Geroscience.** 2021 Jun;43(3):1283-1302. doi: 10.1007/s11357-021-00347-9. Epub 2021 Apr 19. PMID: 33870444; PMCID: PMC8190237.**
- Modifications of H3K4 methylation levels are associated with DNA hypermethylation in acute myeloid leukemia. Scalea S, Maresca C, Catalanotto C, Marino R, Cogoni C, **Reale A, Zampieri M, Zardo G. FEBS J.** 2020 Mar;287(6):1155-1175. doi: 10.1111/febs.15086. Epub 2019 Oct 23. PMID: 31599112
- MicroRNA in Control of Gene Expression: An Overview of Nuclear Functions. Catalanotto C, Cogoni C, **Zardo G. Int J Mol Sci.** 2016 Oct 13;17(10):1712. doi: 10.3390/ijms17101712. PMID: 27754357
- Polycombs and microRNA-223 regulate human granulopoiesis by transcriptional control of target gene expression. **Zardo G, Ciolfi A, Vian L, et al. Blood.** 2012 Apr 26;119(17):4034-46. doi: 10.1182/blood-2011-08-371344. Epub 2012 Feb 10. PMID: 22327224
- Integrated genomic and epigenetic analyses pinpoint biallelic gene inactivation in tumors. **Zardo G, Tiirikainen MI, Hong C, et al. Nat Genet.** 2002 Nov;32(3):453-8. doi: 10.1038/ng1007. Epub 2002 Sep 30. PMID: 12355068
- Epigenetic silencing of the myelopoiesis regulator microRNA-223 by the AML1/ETO oncoprotein. Fazi F, Racanicchi S, **Zardo G. et al. Cancer Cell.** 2007 Nov;12(5):457-66. doi: 10.1016/j.ccr.2007.09.020.PMID: 17996649

Grants/Projects/Open Positions/Conferences

Increased PARYlation impacts DNA demethylation processes in type 2 diabetes mellitus; Progetti Medi; Responsabile: ZAMPIERI Michele; Numero protocollo: RM120172AC70973A

Impact of oxidative stress on the regulatory interplay between PARYlation and DNA methylation profile in type 2 diabetes mellitus; Progetti Medi; Responsabile: ZAMPIERI Michele; Numero protocollo: RM12117A8614B6F9

Interplay between PARYlation and deregulation of the DNA demethylation pathway in type 2 diabetes mellitus. Progetti Medi; Responsabile: REALE Anna; Numero protocollo: RM11916B7A2348C8

Epigenetic origins of Ten-eleven translocation (TET) enzyme 2 silencing in normal appearing white matter of the Multiple Sclerosis affected brain; Progetti Piccoli. Responsabile: ZAMPIERI Michele; Numero protocollo: RP11715C4AF2F983