

2<sup>nd</sup> International Congress on

# EPIGENETICS & CHROMATIN

November 06-08, 2017 | Frankfurt, Germany



## Mario Bauer

Helmholtz Centre for Environmental Research-UFZ, Germany

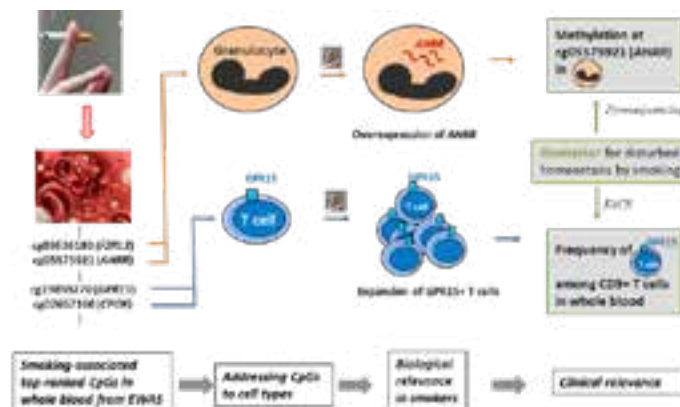
### Cell type-specific methylation pattern: A chance to minimize cohorts for epigenome-wide studies

**Statement of the Problem:** Epigenome-wide association studies (EWAS) revealed that independent of analyzed tissue, the degree of methylation changes by environmental or lifestyle factors are, in general, vanishingly small, although of high statistical significance. This small methylation difference determines the unfavorable need for greater cohorts when more genome-wide methylation sites will be analyzed. Besides, the biological relevance of methylation changes is still poorly understood.

**Methodology & Theoretical Orientation:** To evaluate the distribution of methylation changes in whole blood composed of different cell types, smoking-induced top-ranked and replicated single CpG sites were analyzed in separated cell types of healthy volunteers. Additionally, to get insight into the biological relevance of methylation changes, CpG-annotated gene and protein expressions were investigated.

**Findings:** First, methylation changes in blood are cell-type specific distributed. Smoking-induced methylation changes in whole blood (-21%) at cg05575921 (AHRR) rely on methylation changes (-55%) in granulocytes. Second, methylation shift of about 2% in whole blood at cg19859270 (GPR15) was found to be a cell type-specific CpG for GPR15-expressing cells. Tobacco smoking specifically induced the expansion of GPR15+ T cells as the major GPR15+ cell type in blood, thus provoked the methylation shift of the cell type specific cg19859270 in whole blood.

**Conclusion & Significance:** Addressing methylation changes to single cell types of the blood enable to perform EWAS on replicated smaller cohorts in contrast to the requirement of larger international consortium-based approaches considering the statistical needs of next generation sequencing based methods using whole blood. Thus, the identification of specific cell type responsible for the associated methylation shift in whole blood to the endpoint of interest has to be a prioritized approach in association studies especially for interpretation of molecular epigenetic signs in context of the diverse biological function of the tissue blood and for establishment of valuable biomarkers.



**Figure 1:** Strategy to uncover the biological importance of condition-triggered methylation changes at the example of smoking-induced changes in blood.

2<sup>nd</sup> International Congress on

# EPIGENETICS & CHROMATIN

November 06-08, 2017 | Frankfurt, Germany

## Recent Publications

1. Bauer M, Linsel G, Fink B, Offenberg K, Hahn A M, Sack U et al. (2015) A varying T cell subtype explains apparent tobacco smoking induced single CpG hypomethylation in whole blood. *Clinical Epigenetics* 7(1):81.
2. Bauer M, Fink B, Thurmann L, Eszlinger M, Herberth G and Lehmann I (2015) Tobacco smoking differently influences cell types of the innate and adaptive immune system-indications from CpG site methylation. *Clinical Epigenetics* 7:83.
3. Bauer T, Trump S, Ishaque N, Thurmann L, Gu L, Bauer M et al. (2016) Environment-induced epigenetic reprogramming in genomic regulatory elements in smoking mothers and their children. *Molecular Systems Biology* 12(3):861.
4. Trump S, Bieg M, Gu Z, Thurmann L, Bauer T, Bauer M et al. (2016) Prenatal maternal stress and wheeze in children: novel insights into epigenetic regulation. *Scientific Reports* 6:28616.
5. Junge K M, Bauer T, Geissler S, Hirche F, Thurmann L, Bauer M et al. (2016) Increased vitamin D levels at birth and in early infancy increase offspring allergy risk-evidence for involvement of epigenetic mechanisms. *Journal of Allergy and Clinical Immunology* 137(2):610-3.

## Biography

Mario Bauer is a Specialist in environmental health at the Helmholtz Centre for Environmental Research. His scientific work is focused on identification and risk assessment of environmental and individual genetic dispositions accounting for environment-related diseases. He is an Expert in Toxicology and beyond his research interests he gives private lectures and seminars in environmental medicine at the University of Leipzig.

[mario.bauer@ufz.de](mailto:mario.bauer@ufz.de)

Notes: