

Mission: The mission of the core is to ensure that experimental designs and data analyses take advantage of robust, efficient methods that reflect 'best practices' in biostatistics and bioinformatics.

Services

Computational Bioanalytics (CB) is a service-oriented facility providing state-of-the-art know how for bioinformatics and statistical data analysis, consulting and training aimed at supporting the Austrian life science community. Based on the results of these research projects and cooperation, CB provides a growing number of tools and pipelines for data processing and analysis.

CB hosts a powerful instance of Galaxy (<https://galaxy.medunigraz.at>), a popular web-based platform for data intensive genomics and biomedical research. The facility is focused on the analysis of genomic and clinical data in the field of applied medical research following the guidelines of Good Scientific Practice (Austrian Agency for Research Integrity).

The facility is ISO 9001:2008 certified to ensure safe, reliable and good quality of their services and methods. CB facility is part of the Austrian Bioinformatics Platform (ATBI <http://www.bioinformatik.at>) and a member of the Austrian Statistical Society (ÖSG <http://www.osg.or.at>), cooperating with Austrian bioinformatics and biostatistics research groups to develop and establish new methods and make them available to all CB-users.

CB-Consultation topics in detail:

- Designing clinical trials/research studies
- Data management and quality assurance
- Data analysis and interpretation
- Sample size calculation and power analysis
- Scientific report-writing
- Statistical and bioinformatics methods translation
- Grant preparation

Methods and Tools Biostatistics

- Survival Analysis (Kaplan Meier, Cox-Regression, Competing Risk Regression, Joint Models for Longitudinal and Time to Event Data)
- Longitudinal data analysis
- Mixed models (Generalized linear mixed models (GLMM), Linear mixed models (LMM))
- Generalized linear models (GLM) and Generalized estimating equations (GEE)
- Predictions (linear and non-linear Regression, binomial logistic Regression, ordinal logistic Regression, multinomial Regression, Poisson Regression)
- Associations (Chi²-Tests, Correlations, Relative Risk, Odds Ratio)
- Data reduction (Principal components analysis, Cluster analysis)
- Reliability (Cronbach's Alpha, Cohen's Kappa, Concordance indices)
- Analysis of Variance (ANOVA, MANOVA, ANCOVA)
- Non-parametric analysis

The facilities' personnel not only renders services but also provides training in the underlying methods and guided use of data analysis tools and software at ZMF-Academy.



Methods and Tools Bioinformatics

Microbiome research:

Complete pipelines for 16s rRNA based profiling (data pre-processing, OTU clustering, chimera check, alpha and beta diversity with QIIME, Mothur or DADA2, LEfSE, PiCrust etc.)

De-novo bacterial genome assembly and annotation (data pre-processing and QC, velvet, canu, SPAdes, GeneMark, prokka etc.)

Epi-genetics:

Methylation with microarrays or sequence based (data QC, filtering and trimming, normalization, generating methylation profiles, DMRs – differentially methylated regions, GSEA using minfi, RnBeads, Bismark, Bis-SNP, dmrFinder, EpiExplorer etc.)

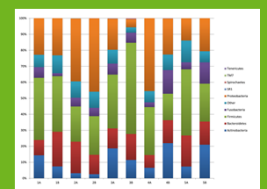
Transcriptomics:

A complete picture of the transcripts obtained from RNA-Seq data. Analytical tools for successful characterization of the transcriptome include QC and trimming, alignment (STAR, HiSat, Bowtie), quantification (HTSeq, featureCounts, Cufflinks...), normalization and differential expression analysis (DESeq, Cuffdiff, MISO...) ending with pathway analysis (KEGG, GO).



ChIP-Seq:

Combination of powerful analytics method (MACS, MEME, MAnorm, ChIPXpress...) for identifying genome-wide DNA binding sites for transcription factors and other proteins.

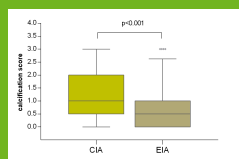
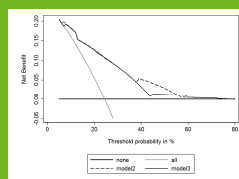


Research fields

The Core Facility collaborates intensely with researchers from Medical University of Graz (MUG) and with external scientists in order to plan, develop and perform bioinformatics and biostatistics data analysis tasks according to specific project needs.

Selection of research fields

- Microbiome research
- Immunology
- Endocrinology
- Biomarker research
- Genetics
- Cancer research
- Clinical Obstetric research and Fertility
- Diabetes and metabolic research
- Pharmacology
- Sustainable Health research
- Cardiovascular diseases



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more than **350** projects in the last 5 years
82 publications in the last 10 years
115 registered users on Galaxy server
 more than **2600** executed jobs every month