

## MOLECULAR BIOLOGY, GENOMICS AND NEXT GEN SEQUENCING UNIT

### Services and platforms

Specialized in molecular biology and genomics, our laboratory provides a wide range of genetic services and products to the health, pharmaceutical, food, and biotechnology industries

### Services: Topic areas

- **Infectious Diseases:** Identification and Diagnosis of known pathogens in biological or industrial applications.
- **Metagenomics:** searching for and identifying genomes of microorganisms (viruses, bacteria and fungi) in a variety of samples (clinical or industrial) for diagnostic or quality control.
- **Oncogenomics/Genetics:** massive or selective analysis of biomarkers in cancer and genetic diseases.
- **Pharmacogenomics:** identification and analysis of genetic polymorphisms in metabolizing enzymes of drugs (phase I and II), transporters and receptors associated with drug response.
- **Sequencing:** Research and DNA sequencing services
- **Personalized Medicine:** Diagnostic applications available for health professionals
- **Animal Genetics:** Research and diagnostic services for breeders and researchers
- **Food quality:** We develop and apply qualitative and quantitative DNA technologies to the genetic traceability of agro-alimentary products in unprocessed and processed products

### General Services

Study Design & Methods Development for:

- Nucleic Acid Isolation
- SNPs genotyping
- Genomic analysis
- Gene, Exon & miRNA Expression
- Genotyping & Copy Number
- Methylation genome analysis
- Gene expression analysis
- TaqMan probes
- Microarrays
- Sanger sequencing
- Next Generation Sequencing



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CENTRO DE INVESTIGACIÓN  
Y DESARROLLO EN  
CIENCIAS DE LA SALUD

- Pharmacogenomics
- Bioinformatic Analysis
- Proteomic analysis
- Focused research programs and GLP for clinical trials

### Platform Specific Services

Real Time platforms:

- LightCycler® 480 Real-Time PCR System
- Xx
- Eppendorf

Microarrays platforms:

- Affymetrix
- Nimblegen
- Next Generation Sequencing
- 454 GS FLX Titanium series Genome Sequencer
- JR 454
- IonTorrent
- 2D-Gel Systems, BioRad
- Resource Center

### MagNA Pure LC Instrument (Roche)

Robotic workstation fully automated for rapid, cross-contamination-free preparation of nucleic acids, and PCR setup.

Up to 32 nucleic acid isolations (e.g. cellular, viral, bacterial or fungal DNA, RNA, or mRNA) from a broad variety of samples such as blood, blood cells, culture cells, plasma, serum, sputum, stool, BAL, plant tissues or food products can be performed in approx. one to three hours.

### QIACube (Quiagen)

For fully automated sample prep using spin-column kits (up to 12 samples)

Elimination of manual processing steps

Purification of DNA, RNA, or proteins

More free time with affordable automated processing

Standardized results and increased productivity

#### IV. TRADITIONAL HORIZONTAL ELECTROPHORESIS:

For DNA, RNA and proteins electrophoresis

The system includes:

- Internal darkroom, Camera, UV- and white-light illumination, filter slider with amber filter, and UV-protection shield.
- For everything from "capture and print" to higher-level 1-D analysis, the system also includes the intuitive and easy-to-use Quantity One 1-D analysis software and unlimited copies of Quantity One Basic software.
- High-resolution imaging with 1.4 million pixels.
- Motorized zoom lens for hands-free gel documentation.
- Broad detection range covers 3 orders of magnitude.
- Real-time imaging for quick positioning and focusing of samples.
- Onscreen integration — No need to save an image; simply "freeze" it at the desired Intensity.
- Quantity One quick guides guide you through acquisition to analysis using the fewest steps possible.
- FireWire interface for rapid data transfer.
- Upgradable to the ChemiDoc XRS system.

#### Bioanalyzer 2100 (Agilent)

- Automated, fast analysis with excellent data quality
- Unique RNA Integrity Number (RIN) algorithm for unbiased total RNA integrity assessment
- Ready-to-use assays and pre-packaged reagent kits
- Minimal sample consumption (1-4  $\mu$ L) and results within 30 minutes
- Replaceable electrode cartridge for contamination-free switch of methods
- Improved assay accuracy and precision, ensure comparable results from lab to lab
- Digital data for convenient analysis, archiving and storage
- Various data-display options as gel view, electropherograms and tables
- Easy to use with simplified sample comparison
- Minimum exposure to hazardous materials
- Supports compliance with 21 CFR Part 11

## Experion (BioRad)

Automated Analysis of DNA, RNA and Protein Purity

One of the most appropriate applications of automated protein electrophoresis is to accelerate process development by monitoring column fractions during chromatographic purification. This can apply to checking the purity of a monoclonal antibody in an industrial quality control setting or following the purification of an engineered polyhistidinetagged protein. The ability to have protein sizing, quantitation, and purity information all within 30 minutes allows for quick identification of the most important fractions to pursue and enables faster fine-tuning of purification methods.

CHT™ ceramic hydroxyapatite purification of protein A–purified murine IgG (MAb). A. Chromatogram generated by BioLogic™ DuoFlow software showing the CHT-purified antibody. Three fractions, designated 1, 2, and 3, were chosen for Experion analysis. Blue trace, A280; black trace, NaCl gradient.

B–D. Experion Pro260 analysis showing the electropherogram (left) and virtual gel images (right) of fractions 1 (B), 2 (C), and 3 (D). L, Pro260 protein ladder; right lane, MAb-containing fraction.

E. Composite gel image comparing all three fractions.

## Microarray Affymetrix Platform

Services For:

- Genomic studies
- Agriculture
- Food and Nutrition
- Diagnostics
- Clinical Trials

## Affymetrix Platform

Genomic analysis:

- SNP Genotyping & CNV Analysis
- Genome-Wide Human SNP Array 6.0
- Genome-Wide Human SNP Array 5.0
- Mapping 500K Array Set
- Mapping 100K Array Set
- Mapping 10K 2.0 Array Set



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- Mouse Diversity Genotyping Array
- SNP Genotyping Array Plates
- Cytogenetics Research Solution
- Targeted Genotyping
- Universal 70K Tag Array
- Universal 25K Tag Array
- Universal 10K Tag Array
- Universal 5K Tag Array
- Universal 3K Tag Array
- DMET-drug metabolism
- Resequencing

#### **Gene expression analysis**

- Whole-Transcript Expression
- Transcript Mapping
- Exon & Gene Level Arrays
- 3' Analysis
- microRNA Expression
- Gene Regulation Analysis
- Tiling Arrays
- ChIP-on-chip

#### **Prokaryotic gene expression analysis arrays**

NimbleGene Platform

Services for:

- Sequence Capture
- Microarrays
- Sequence Capture
- CGH
- Whole-Genome
- CNV Designs
- Exon-Focused Designs
- Cytogenetics
- DNA Methylation
- Gene Expression

## AMPLICHIP CYP450 TEST

AmpliChip™ is the first FDA-cleared microarray assay to identify an individual's genetic variation in two critical drug metabolism genes, CYP2D6 and CYP2C19 (personalized medicine)

The world's first microarray-based pharmacogenomic test cleared for clinical use.

The AmpliChip CYP450 Test provides comprehensive detection of gene variations — including deletions and duplications — for the CYP2D6 and CYP2C19 genes, which play a major role in the metabolism of an estimated 25% of all prescription drugs. It is intended to be an aid to clinicians in determining therapeutic strategy and treatment dose for therapeutics metabolized by the CYP2D6 or CYP2C19 gene product.

Pharmaceutical applications and Bio-Discovery Programs.

Cytochrome P450 enzymes affect the metabolism of nearly half of the drugs used today.

Genetic variations (polymorphisms) in the CYP450 enzymes result in abnormal drug metabolism which can lead to adverse drug reactions or suboptimal therapeutic response.

### Automated hybridization system (Autolipa 48)

- Process with speed
- Washing in less than 3.5 minutes
- Processing of up to 48 samples per run
- Results within 2–3.5 hours
- Feel confident
- CE marked in accordance with IVD Directive 98/79/EC
- Translations of Instructions for Use\*
- Translations of Instrument Display screen\*
- Color codes
- Storage of instrument test-run data and export of run parameters via BlotWare
- Standardization of test manipulation: high accuracy and reproducibility
- Availability of password protection
- High system safety for the user



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## Sequencer Instruments

Applications:

- Ancient DNA
- ChIP-seq/Methylation/Epigenetics
- Eukaryote Whole Genome
- Expression Tags
- HIV Sequencing
- Metagenomics & Microbial Diversity (Microbial whole genome sequencing)
- Mitochondria/ Viruses/ Plastids/ Plasmids
- Prokaryote Whole Genome
- Sequence Capture Targeted Region
- Small RNA
- miRNA discovery
- Somatic Variation Detection
- Transcriptome Sequencing and cDNA library screening
- Mutation discovery
- Application Notes

## Proteomic service

The word proteomics was coined in 1997 to describe the changes in all proteins expressed by a genome.

Proteomics can be defined as the large-scale systematic study of proteins expressed in a cell, tissue, organ or organism.

Our service for protein analysis include: separation, quantitation and identification of the proteins. We also offer service to look your protein targeted towards sub-cellular compartments, organelles, or certain protein types.

We are able to offer several sophisticated proteomic techniques including:

## Sample preparation

Fractionation by Organic Solvent—separate complex protein mix, hydrophobic membrane, etc

Two-dimensional electrophoresis.

Translational modifications analysis (Glycosilation, phosphorilation, methilation, etc)

Imaging scanner and analysis.

## Spot Picking

Bioinformatics in proteomics to identify, quantify, and characterize proteins.

Functional proteomic laboratory service.

The EXQuest spot cutter offers fast, hands-free gel excision with unparalleled accuracy and reliability.

Whether you require only occasional gel cutting or high-throughput cutting on a daily basis, EXQuest can help improve the workflow and increase the accuracy of the results.

### **Application and Format Flexibility:**

Visible applications, such as Coomassie Blue and silver stains

UV-based applications, such as SYPRO Ruby and Orange stains

### **The EXQuest spot cutter**

Proteomic platform:

*Gel Excision service for Every Lab*

- Hands-Free Multi-Gel Imaging and Plat
- Processing Image and cut up to 4 gels at a time
- High-throughput processing with 4 microplate capacity
- Sophisticated Liquid Handling
- Vacuum pickup and liquid-facilitated delivery for the most accurate gel recovery available, >99.5%
- Dispensing volumes are automatically calculated based on gel thickness and well volume
- High-Speed Precision Robotics
- New-generation Cartesian robotics reliability delivers up to 600 spots per hour
- Resolution of 100 microns for unbeatable precision

### *Clinical proteomics*

Clinical proteomics is the application of proteomics techniques to the medical field.

The goal becomes the characterization of the cellular circuitry and the understanding of the impact of disease and therapy on cellular networks.

The main aim of this methodology is to identify proteins involved in pathological processes and to understand how illness can lead to altered protein expression.

Clinical proteomics offers the opportunity and the potential to develop new diagnostic and prognostic tests, to identify new therapeutic targets, and eventually to allow the design of individualized patient treatment.

*Here we present an overview of our proteomic services to the study of disease and its potential to improve diagnosis and prognosis:*

Advice for Clinical sample collection and handling to preserve proteins, New technology, including protein arrays, microanalytic devices, Biosensors for protein-based clinical bioassays, Clinical chemistry assays, Bioinformatics tools including pattern recognition, and computer learning algorithms