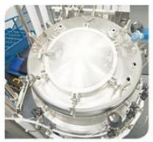


Eurofins CDMO

(Bio)Pharmaceutical Development Services

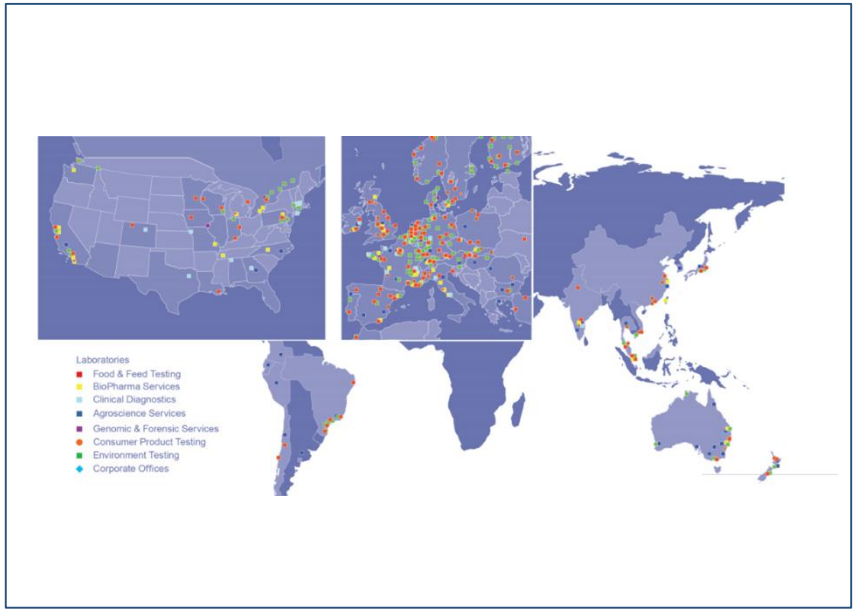
October, 2019

Eurofins Overview

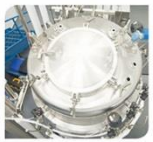




Global leader in the pharmaceutical, food, environmental testing market

- **Founded in 1987 in Nantes, France**
- **HQ : Brussels, Belgium**
- **Listed in Paris**
- **Revenues : € 3.78 Billion (2018)**
- **Network of 800 laboratories in 47 countries**
- **Employees : >45,000**



Eurofins Biopharma Services


Discovery Pharmacology

High-throughput screening

Molecular Pharmacology

Cell-based Assays
In Vitro Screening
In Vitro Profiling
In Vivo Safety
In Vivo efficacy

Pre-Clinical/ Early Development

Pharmacology & Bioanalytical Analysis

DMPK/ADME

Immunogenicity

Biosafety

Toxicology and toxicity

Genomics

Oligonucleotides

Sequencing

Gene Synthesis

Gene Fragments

Next Generation Sequencing

Plasmid Verfiication

GMP & Regulatory Oligo Manufacturing

Clinical

Biomarkers

Bioanalysis

Immunogenicity

Proteomics

Microbiological and Anti-infective analysis

Bioavailability

Bioequivalence

Phase I/II Studies

Specialty Clinical Diagnostics

Cardiovascular Diseases

Molecular

Infectious Diseases

Immune Response Monitoring

Vaccine Safety/Efficacy

Allergy & Hypersensitivity

Biomarkers & companion diagnostics

BioPharma Product Testing (BPT)

Pharmaceuticals

Biologics

Medical Devices

Safety, Characterization, & Quality Control

Process Development

Starting materials through finished products

Packaging

CDMO

Complex small molecule API Development

Biologics Drug Substance Development

Cytotoxic & Highly Potent Compounds

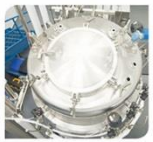
Pre-Formulation/ Formulation

Non-GMP & GMP Manufacturing

Fill & Finish

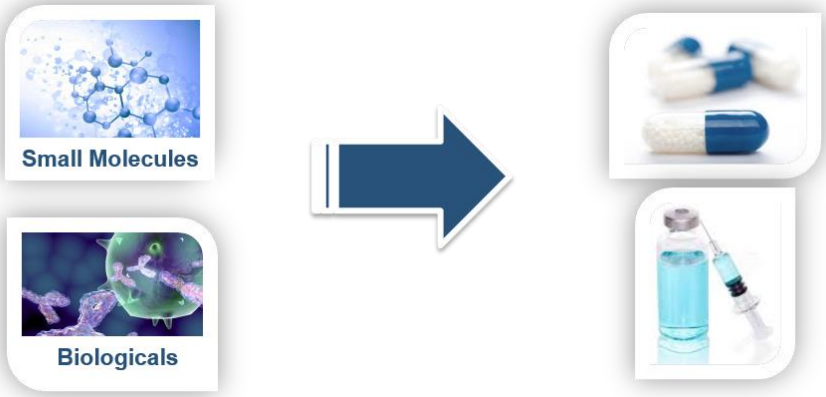
Clinical Trial Material: Packaging & Logistics

Eurofins CDMO

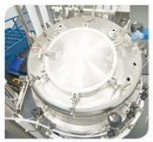

The most innovative, flexible and agile team of science experts in the global CDMO market.

Fully integrated services enabling the most efficient pathway
from preclinical candidate to late phase clinical product and commercialization.



** Contract Development & Manufacturing Organization*

Services


Research → Pre-clinical → Clinical → Commercial

OUR FOCUS

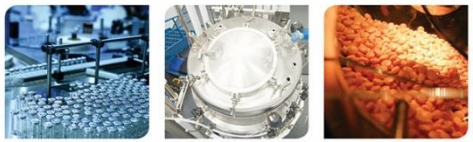
SMALL COMMERCIAL BATCHES

ORPHAN DRUGS

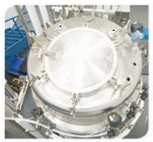
EUROPEAN MEDICINES AGENCY SCIENCE MEDICINES HEALTH · ansm · anses · FDA · Pmda · famhp

Oral | Sub Lingual | Topical | Transdermal | Inhalation | Mucosal | Injectable	INCLUDING HIGHLY POTENT (CYTOTOXIC, HORMONES)	DRUG SUBSTANCE		DRUG PRODUCT	
		Development	Manufacturing	Development	Manufacturing
BIOLOGICALS		✓	✓	✓	✓
SMALL MOLECULES		✓	✓	✓	✓

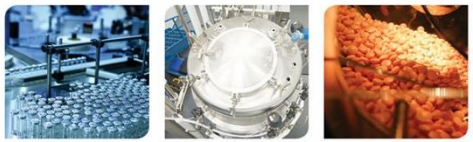
Global Presence



Why Work with Us?

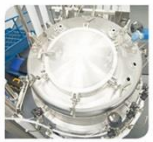




Depth of Experience



Small molecule drug development projects	610 +
Biologic drug development projects	120 +
Number of Batches Produced	500 + Yearly
Number of active clients	155 +

API | Technology Services


Focused On:

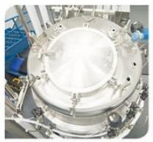
- **Complex API Synthesis**
  - Multi-step, multiple chiral centers
  - Synthetic route evaluation & design
  - PR&D Scale-up
  - Prep Chromatography
- **Small Volume Niche APIs**
  - Niche indications
  - Orphan drugs
- **Highly Potent Compounds**
  - Up to Cat 3b in Pilot Plants
  - Up to Cat 4 in dedicated R&D & GMP Facility

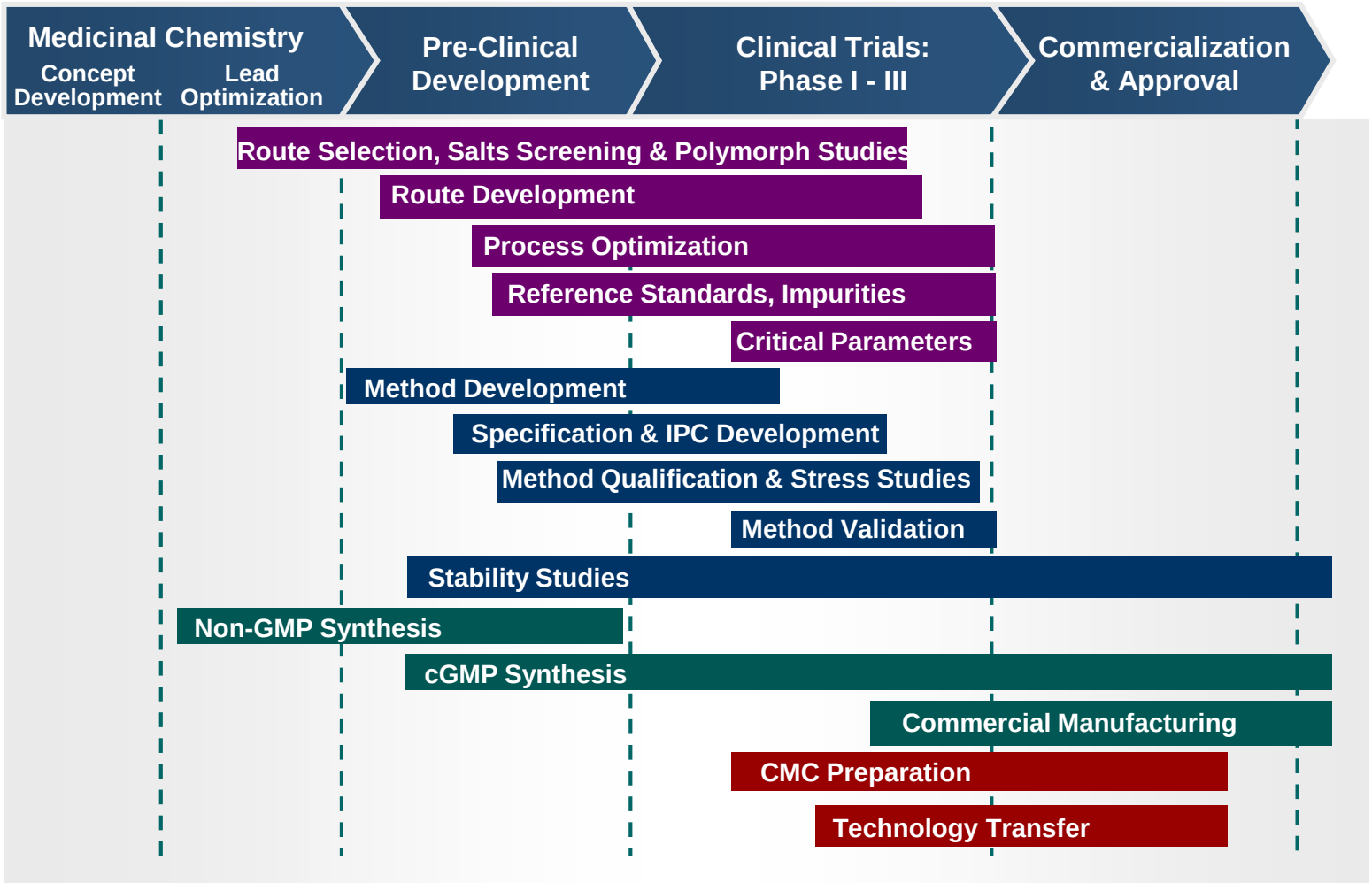
To Support:

- **IND Development Programs**
  - Preclinical to Phase II
- **Phase II to Commercialization**
- **Registration and Validation**

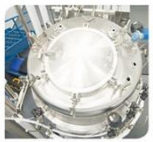
“The Right Development at the Right Time”

API | Technology Dev. & Manufacturing

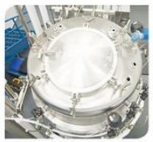
API | Technology Services


- Route Scouting
- Process Evaluation
- Scale-up Development
- Design of Experiments (DoE)
- Critical Process Parameter
- Impurity Marker Synthesis
- Impurity Fate and Purge Studies
- Structure Characterization & Elucidation

- Automated Flash Chromatography (mg to kg)
- Polymorph Screening
- Solid State Science
- Validation Preparation
- Process Hazards Safety Assessment

API | R&D Technologies

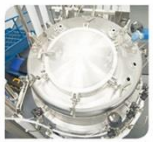

- **Spray Drying**
  - Continuous Process
  - Amorphous Dispersions of API
- **Flow Chemistry**
  - Hazardous Reactions
  - Rapid Reaction Optimization
  - Ideal for Reaction Condition and Scale Up
- **Freez-Drying**
  - Labile and/or Ionized Compounds
  - Oligopeptides and Oligonucleotides
- **Parallel Reactors**
  - Process Optimization and DoE Studies
- **FBRM (Focused Beam Reflectance Measurement)**
  - Crystallization Process Development

Spray Drying

Chemtrix™ Platform
Labtrix™ for R&D Scale
Kilotrix™ for cGMP Kilolab Scale

Vapourtec™

API | Solid State Research & Development


High-Throughput Screening

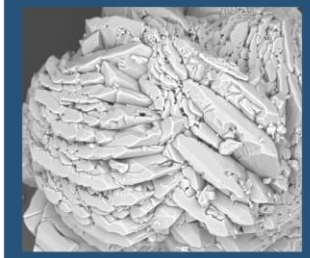
Screening for discovery of new polymorphs, pharmaceutical salts, solvates, co-crystals, etc.

Freeslate Junior HTS

Characterization

Complete physicochemical characterization of APIs and advanced intermediates utilizing state-of-the-art instrumentation.

PXRD, SCXRD, DSC, TGA
PSD (wet/dry/inline)
SEM with EDS
FT-IR
Solid State NMR

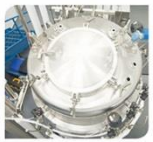


Process Development

Optimized crystallization and scale-up through crystal engineering and inline monitoring techniques.

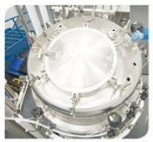
Crystal 16 Solubility
Metastable Zone Studies
Particle Track FBRM

API | GMP Analytical Services

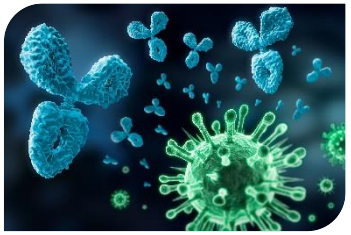

- **Method qualification and validation**
  - Phase appropriate
  - Forced Degradation Studies
  - Photostability Studies
  - QbD Method Development – FUSION software
- **Identification, Characterization & Qualifications**
  - Starting materials, intermediates, impurities & API's
- **In-Process Controls**
- **Fate of Impurities Study**
- **Reference Standard Preparation and Qualification**
- **Development of methods for pGTI's (ppm & ppb levels)**
  - GCMS
  - LCMS
- **Non-Chromophore API's and intermediates**
  - Evaporative Light Scattering (ELS)
  - Mass Spec
  - Flame ionisation detector (FID)
  - Electron capture detector (ECD)
  - Charged aerosol detection (CAD)
- **Method Transfers**

DS I Bioprocess Development and Biomanufacturing

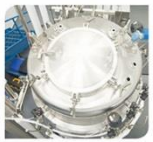

Development and API production for human & veterinary use

- Prokaryotic and eukaryotic expression systems
- Production of high quality material for research, diagnostic purposes and of processing aids (e.g. cytokines used in the production of cell therapy products)
- cGMP manufacturing:
  - Recombinant proteins
  - Live bacteria, including spore formers and anaerobic bacteria that can be used as drugs or vaccine vehicles
- Stability testing (real time and accelerated)



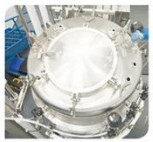
Non GMP & GMP Biomanufacturing	Batch size
Disposable bioreactors	Up to 200 L
Roller bottles	Up to 200 units
Cell factories	Up to 6xCF40
Wave bags	Up to 50 L

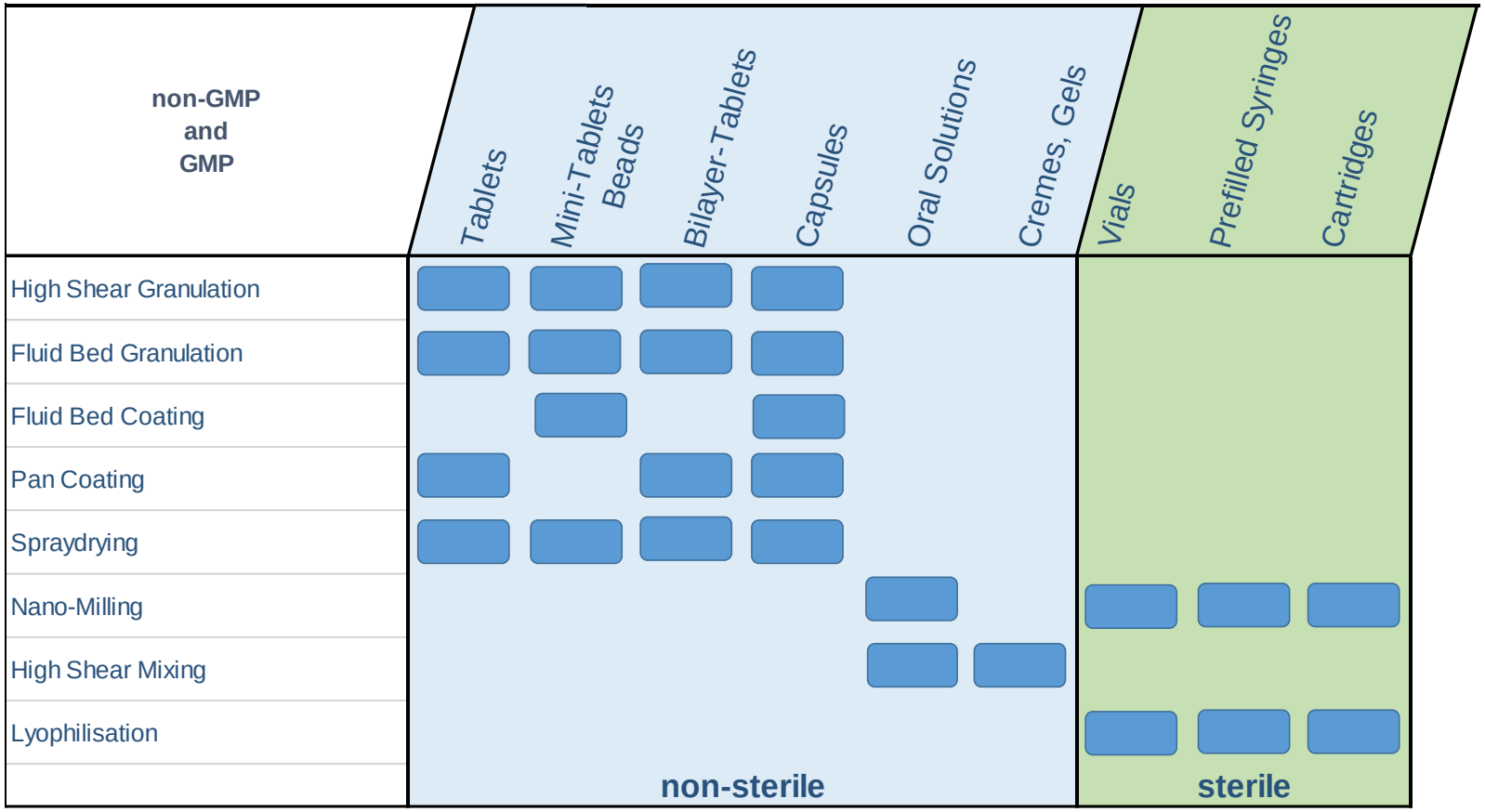
DP | Small Molecules development

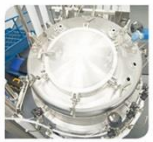

- Strong expertise in preformulation and formulation development (Non GMP/GMP) for oral, topical and parenteral dosage forms including placebos
- Standard technologies such as granulation, fluid-bed granulation and coating, pan coating available in small scale
- Experience with BCS class II and IV compounds suffering from low-solubility (spraydrying, co-micronization, nano-milling, S(M)EDDS)
- Development of lyophilization cycles
- Accelerated Stability Assessment Program (ASAP)
- Adapted technologies (taste masking) & dosage forms (minitablets, orodispersible drugs, oral freeze-dried products) for good palatability
- Long experience in liquid formulation

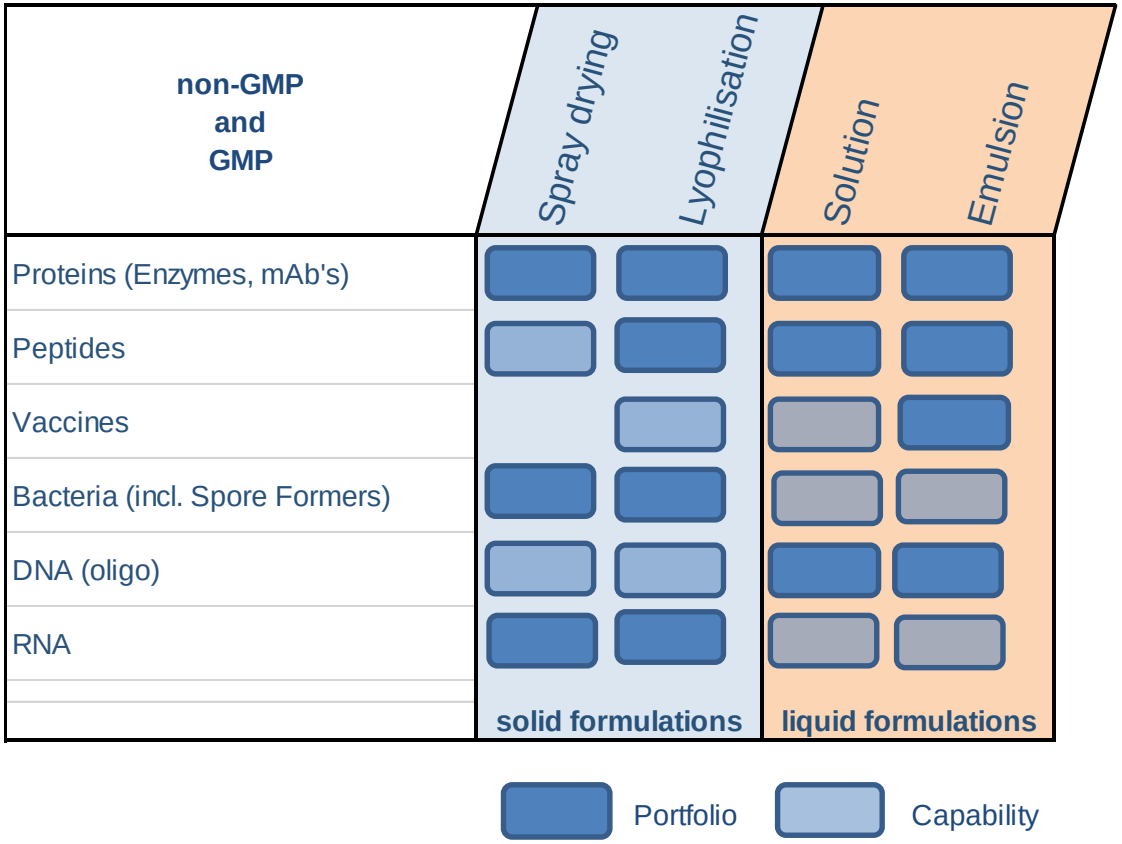
DP | Small Molecules Technologies and Applications

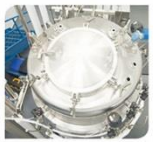
DP I Biologicals Formulation Development

- Wide range of technologies & dosage forms
- Specific experience on colon-targeted formulations
- Large portfolio of biological analytical methods to support development

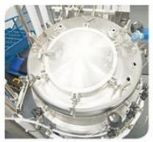
DP | Analytical Support


Analytical Methods	Biophysical methods	Stability studies
• Chromatography (UHPLC) *RPC* *Ion-exchange* *Size-exclusion* *Affinity* *2D-LC* *RI and UV detection* • Osmolality • Density • Water content (KF) • Water activity • Dissolution testing (USPI, II and III) • Hardness • Disintegration • GC • HRMS (QTOF)	• Calorimetry (m)DSC • Spectroscopic methods *FT-IR* *UV-VIS* *Fluorescence* • Dynamic light scattering • Zeta-potential • Viscosity • Rheometry* • Microflow imaging (part. matter analysis) • Laser Diffraction (powder and liquid) • SEM* • Raman* • XRD* • Hot and freeze stage analysis • Syringeability testing • Morpho G3	• In use testing • Excipient compatibility • ASAP (predictive modelling) • ICH • Accelerated Stability • Forced degradation • Photostability studies

* Outsourced to partners

DP | Non Sterile GMP Manufacturing

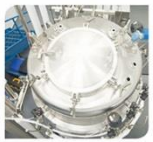




Key features

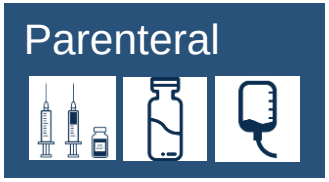
- Equipment adequately scaled for early clinical phases up to small commercial batches
- High yields, low drug substance loss

Technology	Batch size
Solutions, suspensions, emulsions	5 mL up to 50 L (200 L if no heating)
Semi-solids	5 g up to 50 kg
Tablets	100 up to 200,000 units
Capsules	100 up to 200,000 units

DP | Sterile GMP Manufacturing

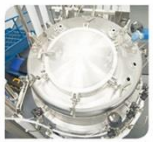

- Liquid & lyophilized drug products
- Small filling volumes from 0,5 mL and up to 50 mL (manual & automatic systems)
- Small size of bulk volume
- Low line loss, down to 15 mL



Authorizations for all DS
except sexual hormones, cephalosporin / β-Lactam

Bulk	From < 0,5L and up to 20L
Vials	Up to 5,000 units
Syringes - Cartridges	Up to 5,000 units
IV Bags	Bulk up to 20L

DP | Clinical Trial Supply


- 30 years of experience in Clinical Trial Material (IMP, IVP, Medical Device)
- Global experience / Cold chain capacities
- Placebo development / Double-blind management
- QP Release of Drug Products
- Controlled drugs management

- **Primary & secondary packaging**
  - *Customized solutions for patient kits*
  - *Randomization list & decoding envelopes*
  - *Support on supply chain strategy*
  - *Ancillaries supply & kits*
  - *Web interface for shipment management*
  - *Comparator supply, blinding & labeling*
  - *Extension of expiry date*

	• 5 ISO7 suites • 3 ISO8 suites
Secondary packaging	• 13 suites at RT and 2/8°C
Storage	• 700 m³ ((25 000 ft³)

- **QP services**
  - *GMP certification/Final batch release*
  - *Site audits to support QP declaration/import, testing & certification and/or release of batches*
- **GMP storage** 15 - 25°C / 2 – 8°C / -20°C / - 80°C
- **Distribution**

Corporate QP on site

Orphan Drugs | Full Cycle Support

ORPHAN DRUGS

Short cycle from clinical to market

Small size commercial batches

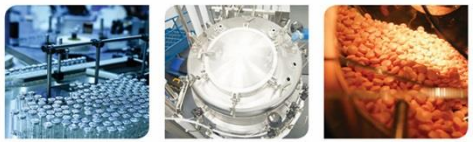
Our experience in Orphan Drugs (including pediatric):

- Pharmaceutical development, manufacturing of clinical & commercial batches
- Regulatory support with preparation of quality files

4 commercial products are routinely manufactured for EU and Japan markets

25 + developments and clinical batches production for rare diseases

Let's Start!



eurofins | CDMO

Fully integrated services enabling the most efficient pathway from preclinical candidate to late phase clinical product and commercialization.

- Preclinical and early clinical development
- Clinical and small scale manufacturing (GMP)
- Clinical trial material (packaging & logistics)
- Global project management | CMC - RA

Contact us!

cdmo@eurofins.com

www.eurofins.com/cdmo