Syngene

Putting Science to Work

Formulation Development

Stable and compliant drug formulations across oral solids and parenterals

Formulation Development

Capabilities

- Pre formulation profiling including salt and polymorph screening
- Preclinical formulation development
- Drug-drug and drug-excipient compatibility study
- Formulation development – oral solids, liquids, semisolids (OEL up to 1 µg/m^3)
- Formulation development – injectables (OEL up to 0.1 µg/m^3)
- Ready to use and lyophilized injectable product development, including nanosuspensions
- High potent injectable dosage form development
- Development of palatable dosage forms for companion animals (hard chews and soft chews), spot on formulations
- Formulation Development of oral solids (modified release, controlled released, timed release, delayed release
- Novel drug delivery systems (liposomes, nano-emulsions, biodegradable polymers-based microspheres, nanoparticles and in situ depots)
- Enabling formulation approaches – spray-dried dispersion (SDD), hot melt extrusion (HME), lipid based, complexation-based self-micro emulsifying drug delivery system (SMEDDS) and nanosuspensions
- Analytical method development and validation
- CGMP manufacturing and clinical supplies
- Clinical supplies manufacturing for solid orals (OEL up to 1 µg/m^3)
- Scale-up and technology transfer
- Phase I/phase II and phase III clinical supplies/registration batches / process validation batches
- Small scale commercial supply
    - Niche and orphan drug products (current batch size up to120 kg batch size (upscaling up to 200-400 kg scale by 2023)

Integrated CMC Development Services – Lead to FIH

- Salt and fit for purpose polymorph screening for first- in- human (FIH) studies
- Pre-formulation package to assess the physico-chemical properties and design
- Identification of the right enabling approach by screening different enabling approaches using scientific rationale post drug developability assessment
- Advantage of multidisciplinary scientific team in the same campus
- Fit-for-purpose analytical method development and validation

Highlights

- Quick-to-clinic approaches for phase 1 clinical studies (FIH)
- Expertise in animal health care formulation development
- Expertise in parenteral formulation development and small-scale clinical batch manufacturing (ready-to-use vials and prefilled syringes)
- Delivered over 20 integrated CMC projects in last five years
- Can involve in 505(b)(2) programs as early as ideation process, repurposing of molecules and identifying unmet medical need
- Clean regulatory track record with different regulatory bodies across the globe (USFDA and Russian Regulatory Agency- approved, oral solid manufacturing facility)

Oral Solid Dosage Forms

Capabilities

- State-of-the-art GMP manufacturing facility for solid orals (phase 1 to low volume commercials)
- APIs having OEL up to 1 µg/m^3 can be handled for drug product manufacturing
- Batch sizes of up to 120 kg can be handled currently, upgradable up to batch of 200-400 kg by 2023
- Unit operations such as dry and wet granulation, wurster coating, blending, spray drying, Tablet compression, tablet coating, encapsulation, extrusion and spheronization
- Automatic capsule filling machine for pellets, powders and mini tablets
- Blister packing machine; ALU- ALU, PVC-ALU, PVC/PVDC-ALU and automatic bottle packing machine for tablets and capsules

Highlights

- Expertise in enabling technologies (spray drying, hot melt extrusion, nanosuspension, SMEDDS) and modified release formulation development
- Successfully completed "ideation to PoC " for a hybrid application for EU/505(b)2 for U.S.
- Strong track record of consistently delivering integrated CMC programs year-on- year (18 projects over the past five years)
- Experienced in late-phase product development requirements and USFDA query responses
- US FDA and Russian Regulatory- approved manufacturing, quality control and stability facility
- Consistently delivering 35-40 GMP campaigns per year

Parenteral Dosage Forms

Capabilities

Injectables:

- Conventional products such as ready-to-use (aqueous as well as non-aqueous) and lyophilized products
- Complex products such as nano/micro suspensions, nano emulsion, liposomes, microspheres and in-situ depot- based products
- Peptide and protein-based products
- Novel modified biodegradable drug – polymer conjugate-based nanoparticle formulation for intravitreal injection
- High potent (oncology and hormonal) injectable dosage forms
- Combination formulations: Drug device combination products for both small molecules and biologics
- Development and ICH regulatory Stability Studies

Ophthalmic:

- Solution, suspension and gel-based products

Nasal:

- Spray and nebulizer- based products

Otic:

- Solution and suspension-based products

Clinical Supplies and Small Scale Manufacturing

Capability to manufacture ready-to-use solutions and lyophilized products (pre-sterilized vials and prefilled syringes)
OEL: ≥ 1 µg /m3 in GMP environment

- Aseptic filtration and filling
- Terminal sterilization
- Batch size of 500 to 25,000 vials, 5L- 50L
- Lyophilization capability for vials (3500 vials of 10R size)
- Capability to handle clinical batch manufacturing of small molecules and biologic products
- Storage chambers of 2 – 8°C and - 30°C

Equipment:

- Vials+ PFS combi filling line under isolator (Make: MAR Italy)
- Isolator-based robotic filling machine for vials and PFS
- Ready-to-use nested vials: Liquid and lyophilized vials with ll volume of 0.5 ml to 50 ml (ISO 2R to ISO 30 R)
- Ready- to- use nested prefilled syringes: Fill volume of 0.1 ml to 10 ml
- Terminal sterilizer; jacket cooling available after sterilization cycle.
- Lyophilizer: Toon China (Model: Lyo-3), Grade B area

We are 21 CFR-compliant wherever applicable

Formulation Development for Animal Health

Supporting drug product development and clinical supply manufacturing for four out of top 10 Animal Health companies in the world

Capabilities

- Dedicated GMP facility for animal health products (up to OEL 1µg/m^3)
- Pre formulation, formulation development and manufacture of oral solids chewable dosage forms for standalone or combination products
- Manufacturing and packing of conventional and bolus tablets
- Development of injectables, spot-on/pour-on formulations
- Development of palatable hard and soft chews tablets for API requiring masking of taste
- Blister packaging capability for small and bolus tablets; PVC-ALU, PVC-PVDC/ALU, Alu-Alu, & Aclar and bottle packaging
- Experienced team dedicated for analytical activities for animal health products

Highlights

- Drug product development, clinical batches, VICH stability studies for multi API combination multi-drug hard chew and soft chew tablets
- Manufacturing and packaging of clinical supplies for companion animals
- Drug product development and lab stability studies for topical and injectable dosage forms
- Robust analytical methods development and validation for combination products and stability studies

ICH Stability Studies

One of Asia's largest stability and analytical facilities spread across 72,000 sq. ft.

Capabilities

- End-to-end offerings including
    - License application
    - Centralized logistics team to handle all inbound and outbound shipments fast clearance being In Sez
    - Statistical analysis
- Studies at dierent phases – FIH, NDA/ ANDA and Commercial
- Multiple walk-in and reach-in chambers covering all climatic zones as per ICH Q1 A(R2), Q1B, Q1C and Q1 F guidelines
- Dedicated centres customized to client requirements

Highlights

- Diverse experience in handling generic, animal health, CPG, nutrition and OTC products
- Comprehensive analytical solutions including method development, validation and in-house microbiology testing
- Backup chambers available as part of business continuity plan
- Biometric access control system for individual chambers apart from overall facility with access control
- Separate infrastructure for handling steroids, hormones, narcotics and other special categories
- USFDA, PMDA, Russian Regulatory Agency- approved facilities
- Electronic data management systems as per 21CFR, Part 11 compliant

Commercial Manufacturing

Capabilities

Manufacturing of Regulatory starting materials, APIs, HPAPI, NCEs & Novel advanced intermediates

Mfg. facility	nGMP	S1 Kilo Lab	Unit 2 Kilo Lab	HPAPI	S14	Mangalore
Range	160 L - 5000 L	10 L - 20 L	10 L - 50 L	60 L - 630 L	60 L - 8,000 L	2000 L - 12,500 L
Total Capacity	26,640 L	120 L	90 L	2010 L	63,600 L	69,600 L
Largest reactor	5,000 L	20 L	50 L	630 L	8,000 L	12,500 L
# Reactors	15	3	4	5	32	11
Total number of reactors (Manufacturing Volumes)					**70 reactors (>161,000 L)**	

Salient Features

- 24/7 operations to ensure optimal utilization of resources
- Broad range of Reactors (Stainless steel, Glass lined, Hastelloy)
- Broad range of Chemistries (Asymmetry catalysis, halogenation, etc.)
- High potency expertise (Cytotoxic, Cytostatic compounds up to 0.1 µg/m^3 - 8h OEL)
- High vacuum (< 10 Torr) & high temperature (140°C) distillations
- Hydrogenator for highly acidic/basic reactions with capacity up to 4 KL and 26 bar pressure rating
- 12 KL cryogenic reactor operating within a temperature range of -90°C to 140°C
- Particle size reduction to < 10 microns with nitrogen and air in class 100,000 area
- Batch sizes range between 100kg (Bangalore) to 40 MT per annum (Mangalore)
- PMDA (commercial) and USFDA (RSM) approved Bangalore S14 manufacturing facilities

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About Syngene

Syngene Syngene International Ltd. (BSE: 539268, NSE: SYNGENE, ISIN: INE398R01022) is an integrated research, development, and manufacturing services company serving the global pharmaceutical, biotechnology, nutrition, animal health, consumer goods, and specialty chemical sectors. Syngene's more than 6000 scientists offer both skills and the capacity to deliver great science, robust data security, and quality manufacturing, at speed, to improve time-to-market and lower the cost of innovation. With a combination of dedicated research facilities for Amgen, Baxter, and Bristol-Myers Squibb as well as 2.2 Mn sq. ft of specialist discovery, development and manufacturing facilities, Syngene works with biotech companies pursuing leading-edge science as well as multinationals, including GSK, Zoetis and Merck KGaA.

For more details, visit www.syngeneintl.com or write to us at bdc@syngeneintl.com

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