Aizant Drug Research Solutions
Integrated Drug Development Solutions
Flow of presentation

• Introduction
• Business verticals
  – CDO Capabilities
  – CMO Capabilities
  – Out-licensing Capabilities
  – CRO Capabilities
• Support functions
• Advantage
• Contacts
Vision & Mission

VISION
- To be a global leader for science based integrated drug development solutions

MISSION
- Pursuit of excellence through science and technology
- Agile team with open communication and honoring deliverables
- Environmentally and socially responsible research

VALUES
- Innovation
- People
- Learning
- Quality
"Aizant" is derived from the name "Aizan", Caribbean goddess of healing and “T” was added for Technology.

- Arrow head represents GROWTH
- Bird in flight signifies FREEDOM
- Four circular walls – four values: Innovation, People, Learning and Quality
- Blue arc – our POSITIVE attitude
- Our logo – GLOBAL experience and standards
## Milestones

<table>
<thead>
<tr>
<th>Year/Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Aizant incorporated</td>
</tr>
<tr>
<td>2008</td>
<td>Formulation R&amp;D and clinical operations started</td>
</tr>
<tr>
<td>2009</td>
<td>cGMP facility commissioned</td>
</tr>
<tr>
<td>Apr 10</td>
<td>Clinical facility audited by US FDA with <strong>NO 483s</strong></td>
</tr>
<tr>
<td>May 10</td>
<td>Diagnostics laboratory accredited by NABL</td>
</tr>
<tr>
<td>Aug 10</td>
<td>Clinical facility was approved by Brazilian ANVISA</td>
</tr>
<tr>
<td>Oct 10</td>
<td>Clinical facility approved by WHO</td>
</tr>
<tr>
<td>Dec 10</td>
<td>Clinical facility approved by Turkey MoH</td>
</tr>
<tr>
<td>Jan 11</td>
<td>Successful US FDA NDA approval for product developed at Aizant</td>
</tr>
<tr>
<td>Feb 12</td>
<td>Started construction of commercial manufacturing facility</td>
</tr>
<tr>
<td>Jun 13</td>
<td>BA/BE facility audited by US FDA with zero 483s</td>
</tr>
<tr>
<td>Oct 13</td>
<td>BA/BE facility audited by ANSM (France)</td>
</tr>
<tr>
<td>Jun 14</td>
<td>First ANDA Filed</td>
</tr>
<tr>
<td>Sep 14</td>
<td>First FTF filed with US FDA</td>
</tr>
<tr>
<td>Oct 14</td>
<td>WHO approval for manufacturing facility</td>
</tr>
</tbody>
</table>
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Business Verticals

**CDO**
- Contract Development
  - NCEs and LCMs
  - Specialty products
  - Enabling formulations
  - Late stage clinical formulations
  - Generics etc.

**CGMP**
- Manufacturing
  - Clinical trial material
  - Commercial manufacturing of low volume products

**Products**
- Out-Licensing
  - FTF (NCE-1s)
  - Value added generics
  - Life Cycle Management (505 b 2)

**CRO**
- Clinical Studies
  - BA/BE studies
  - Bioanalytical
  - Patient studies
  - Clinical trials
CDO – Infrastructure

- State of the art pharmaceutical development laboratories spread over 40,000 sq. feet
- Modern equipments and instruments in formulation and analytical laboratories in tune with latest technology
- ~ 80,000 sq ft open space for scaling up any operations within short time
- Development capabilities for:
  - Oral dosage forms (solid/liquid)
  - Novel Drug Delivery Systems
    - Controlled release/ sustained release/ extended/ modified release dosage forms
    - Multiparticulate systems
    - Gastro-retentive system
  - Topical dosage forms
  - Parenteral dosage forms
    - Lyophilisation
    - Depot formulation
    - Liquid injections
  - Ophthalmic dosage forms
Quality

• Quality is by design and not an after thought
• QbD is fundamental to our operations
  – Target the product profile (TPP)
  – Determine the critical quality attributes (CQAs)
  – Link input material attributes and process parameters to CQAs and perform risk assessment
  – Develop a design space
  – Design and implement a control strategy
  – Manage product lifecycle, including continual improvement
## CDO - Services

### Preformulation
- Reverse engineering
- Thermal analysis
- Dynamic vapor sorption
- Particle size analyser
- Viscosity measurements
- Solubility studies
- Dissolution studies (Type I, II, III, IV)
- XRPD, SEM, Hot stage microscopy*

### Formulation Development
- Dry blending
- High shear granulation
- Fluid bed granulation
- Roller compaction
- Extrusion spherisation
- Wurster coating
- Spray drying
- Micronization
- Pan Coating
- Encapsulation
- Injectable lyophilisation
- Injectable depot formulation

### Analytical Development
- Method development
- Method validation
- Method qualification
- Method transfers
- Stability studies including zone IV studies
- Chiral analysis
- Microscopy

### Other Services
- Scale-up and technology transfer
- Stand alone stability studies
- Product registration and regulatory support
- Clinical support
- Separate facility for potent substances
Differentiating technologies offered

• Nanotechnology
  – Liposomes
  – Nanoparticles
  – Dendrimers
  – Nanofibers
  – Polymeric micelles

• Hot Melt Extrusion (HME)
  – Bioavailability enhancement
  – Stability enhancement
  – Controlled release formulations
  – Product life cycle extension
  – Taste masking and Pediatric dosage form
  – Cost reduction
Differentiating technologies offered

• Potent substances
  – Dedicated Lab of 500 sq. ft area for the Development of Oncology Products
  – Isolator for handling highly toxic (upto Category IV) molecules
  – PAPR (Power Air Purifying Respirator) for additional safety
  – Capability of developing Generic/ NCE Onco products as well as Onco Injectables for 505(b)2 filling.

• Parenteral development
  – Liquid & suspension for injection
  – Lyophilized powder for injection
  – Long acting injectable
  – Ophthalmic solutions & suspensions
  – Liposomes

• Spray drying
cGMP – Infrastructure

- About 10,000 sq. feet cGMP area for low volume commercial supplies, exhibit, scale up and clinical batch manufacturing
- Approved by WHO
- Filed three ANDAs and invited EU agency for regulatory audit.
- Dedicated AHUs
- Flexibility of manufacturing batches up to 80kgs
- Power back to ensure smooth operations
- Ensures OSHA compliance and other industry legislations
- Process train for solid orals:
  - Up to 15 kg
  - Up to 100 kg
## cGMP - Services

<table>
<thead>
<tr>
<th>Scale up</th>
<th>Clinical trial material</th>
<th>Analytics</th>
<th>Other Services</th>
</tr>
</thead>
</table>
| • Scale up of formulation development products  
• Manufacturing batches for regulatory submissions  
• Commercial manufacture  
• All kinds of packaging | • Investigational drug product  
• Placebo  
• Encapsulation of tablets, multiparticulate, capsules and other solid dosage forms  
• Comparator manufacturing  
• Clinical packaging, blinding, randomization | • Testing and release of finished goods  
• Cleaning validation/ process validation  
• Microbiology  
• Stand alone stability testing | • Regulatory support  
• eCTD compilation |

### Analytics
- Testing and release of finished goods
- Cleaning validation/ process validation
- Microbiology
- Stand alone stability testing

### Other Services
- Regulatory support
- eCTD compilation
cGMP Expansion

Transition from CRO to CRAMS of finished product

1. Formulation Development and Clinical Supplies Services

3. Clinical Research Services

2. Manufacturing and Commercial Supply Services

CRAMSTOR
CRO
Expansion – Layout (With Manufacturing)
Salient Features of Manufacturing Plant

• State-of-the art oral solids with capacity to produce *1-billion units* per annum for all regulated and semi-regulated markets.

• Facility is being designed to have:
  • Wet-granulation
  • Dry-granulation
  • Roller compaction
  • Direct compression
  • Multiple Unit Particulate Systems (MUPS) pelletization
  • Extrusion-Spheronization
  • Wurster-Processer
  • Hot-Melt Extrusion (HME)
  • Controlled/Delayed Release (CR/DR) Technologies
  • Unit Dose (Blisters/Strips) and Bottle packaging lines.
  • Provision for dedicated suit for handling clinical supplies and potent actives with novel technology platforms including HME, Nano, MUPS, CR/DR, etc for developing differentiated products.

• Facility is being designed to handle multiple actives and products at a time, yet complying to regulatory norms.
Products – Infrastructure

• Dedicated team for development of internal projects supported by in-house IP team for patent landscape evaluation

• Working on following category of products:
  • NCE-1/ FTF (First to File) – filed 2 FTFs
  • Salt change strategy
  • Life cycle management opportunities (505 b2)
  • Niche generics
  • Me too generics

• Business model
  • Out-licensing with commercial supplies
  • Alternate models such as co-development, technology transfer can be worked out on case to case basis
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Product</th>
<th>Dosage Form</th>
<th>Strength</th>
<th>RLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abiraterone</td>
<td>Tablets</td>
<td>250mg</td>
<td>Zytiga</td>
</tr>
<tr>
<td>2</td>
<td>Acetazolamide</td>
<td>ER Tablets</td>
<td>500mg</td>
<td>Diamox Sequel</td>
</tr>
<tr>
<td>3</td>
<td>Aripiprazole</td>
<td>Tablets/ ODT</td>
<td>2, 5, 10, 15, 20, 30mg</td>
<td>Abilify</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10, 15mg ODT</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cefaclor</td>
<td>Tablets</td>
<td>500mg</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dapsone</td>
<td>Tablets</td>
<td>25, 100mg</td>
<td>Dapsone (US)</td>
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<tr>
<td>6</td>
<td>Febuxostat</td>
<td>Tablets</td>
<td>80,120 mg</td>
<td>Adenuric-EU, Uloric-USA</td>
</tr>
<tr>
<td>7</td>
<td>Felbamate</td>
<td>Tablets</td>
<td>400, 600mg</td>
<td>Felbatol</td>
</tr>
<tr>
<td>8</td>
<td>Lamivudine</td>
<td>Tablets</td>
<td>150, 300mg</td>
<td>Epivir</td>
</tr>
<tr>
<td>9</td>
<td>Metformin XR</td>
<td>Tablets</td>
<td>1000mg</td>
<td>Glucophagex</td>
</tr>
<tr>
<td>10</td>
<td>Naproxen Sodium</td>
<td>ER Tablets</td>
<td>375, 500, 750mg</td>
<td>Naprelan</td>
</tr>
<tr>
<td>11</td>
<td>Tenofovir Fumarate</td>
<td>Tablets</td>
<td>150; 200; 250; 300mg</td>
<td>Viread</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tablets</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Zileuton</td>
<td>C R Tablets</td>
<td>600mg</td>
<td>Zyflo CR</td>
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</tbody>
</table>
CRO – Infrastructure

- 80 bed (2 clinics) facility spread over 28,000 sq feet
- IP based cameras to virtually monitor projects
- Dedicated registration area
- Independent ethics committee/ Institutional Review Board
- In-house NABL accredited clinical diagnostics laboratory
- In-house kitchen
- Bioanalytical laboratories equipped with 10 LCMS/MS including API 5500
- Offsite storage of data for disaster recovery and business continuity
- Volunteer database
  - Male: 8000+
  - Female: 2000+
  - Access to post menopausal women database
CRO - Services

Clinical Pharmacology
- Clinical studies for males, females and special population
- BA/BE studies for global submissions
- Proof of concept studies
- Patient PK Studies
- Food Interaction Studies
- Clinical end point studies and Clinical Trials
- Data Management

Bioanalytics
- Method development and validation
- Method transfer of drugs in biological matrix
- LCMS-MS and HPLC analysis of drugs and metabolites in biological matrix from clinical trial

PK & Biostatistics
- Study design
- CRF review
- Randomization schedule
- Statistical analysis & reporting (SAS 9.2 and WinNonlin 5.2 software)
- Well trained staff

Diagnostics
- Hematology
- Biochemistry
- Immunology
- Urine analysis
- X-ray
CRO - Regulatory approvals

- **US FDA** audited facility with NO 483s
- **ANVISA** inspection successfully completed *(No major or critical observations)*
- **NABL** accreditation for clinical diagnostics
- **DCGI** inspected and approved
- **WHO** approved
- **Turkey MoH** approved
- **ANSM (France)** approved
- **ISO 9001**
- **ISO 15189**
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Project management

- Cross functional project teams from formulation, analytical, quality and regulatory departments
- All projects teams are monitored on MS projects by an experienced project manager
- Metrics based project planning and execution
- Well defined communication systems as decided at beginning of project
- Good track record of completing projects on time
Information technology

- Data-centre with backup and recovery facility
- Offsite data storage for disaster recovery
- IP Cameras for remote virtual monitoring of projects
- Biometrics for cross-check and validation
- Well defined IT policy for security and access control
- Metrics based reporting
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Experience

Projects: Handled over 180+ development and 400+ clinical projects since inception. Development projects include:
- Simple IR, complex IR
- Simple MR, complex MR
- Combination products, LCMs, NCEs

Geography: Rich experience of working in various regulatory environments
- USA, EU, LatAm, Worldwide, RoW

Clients: Versatile in working with various partners
- Big Pharma
- Specialty
- Generics, Indian Generics

Total team of ~400 people between Product development, clinical development and GMP business verticals
Advantage Aizant

- Quality by Design (QbD)
- End to end development solutions
- Differentiated technology solutions and in-house products
- Good understanding of international regulatory environment
- Blend of young, stable, qualified and experience workforce
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