Future supply chains enabled by continuous processing

Clive Badman (GSK), Mauricio Futran (Janssen), Craig Johnston (CMAC), Markus Krumme (Novartis), Jagjit Srai (University of Cambridge)
Problem: Currently, It’s a long way to the Patient

Supply Chain 1-2 Years Start to Finish

- Outsourced Stages
- Make Active Ingredient
- Formulate and distribute

- Slow
- High Inventories between steps
- Long lags for changes to be seen in Formulated Product
- Risks mitigated by dual supplies, stocks and over capacity
- Product quality variability introduces cost and risk
- New technologies require patient-demand centric supply

- Higher cost/dose
- Formulation can be specific to source of active
- Limits access to medicines
- Little chance for process improvement
Discussion

- The significant opportunities to moving to a supply chain flow-through operating model, with substantial opportunities.

- Scenarios for decentralised production models producing a greater variety of products with enhanced volume flexibility

- Production, supply and value chain footprints that are radically different from today’s

- Clinical trial and drug product development cost savings that support more rapid scale-up and market entry models

- The major supply chain and industrial transformational challenges that need to be addressed
## End-to-End Supply Chain Opportunity

<table>
<thead>
<tr>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing Inventory within primes from &gt;200 days to &lt; 70 days</td>
</tr>
<tr>
<td>Manufacturing – cost of quality, Achieve &gt;5σ, Right-First-Time</td>
</tr>
<tr>
<td>1-2 yrs Inventory days of supply – opportunity to reduce 50%</td>
</tr>
<tr>
<td>Reduce Cycle Time by half (starting materials to packed product)</td>
</tr>
<tr>
<td>Reduce Drug Development cost, currently at $1.15bn/drug[ABPI], by 10% (cost to market)</td>
</tr>
<tr>
<td>Enhance Flexibility and Service to patients, improving both patient service and compliance through more demand driven responsive supply chains</td>
</tr>
<tr>
<td>Reduction in Management overheads, reducing the manual interactions in the oversight of batch-campaign operating models, through enhanced by flow-through supply concepts</td>
</tr>
</tbody>
</table>
Future Vision & Opportunity

- Opportunity
- Future vision
- Capturing value
- Designing the End-to-End supply chain
- Resolution and challenges
- Transformation
Conclusions

- Significant opportunities in inventory reduction, lead time to patient and quality.
- Decentralised production and supply models with differentiated products
- Rapid scale-up
- New manufacturing architecture/footprint
- Development savings
- Transformational challenges