Development

Pharmaceutical Development

The process of pharmaceutical development and pharmaceutical formulation includes multiple steps required to bring a pharmaceutical drug product to the market after the molecule has been synthesized. Product development programs at WDPrx are established in facilities and with equipment assuring the highest level of production quality. All systems are cGMP compliant. The facility is DEA licensed for Controlled Substances (Schedules I-V). Projects are scaled according to capacity requirements from low-volume to high-volume production.

Pharmaceutical Formulation Development

Formulation development involves combining different chemicals to produce a final finished dosage pharmaceutical product. WDPrx formulation development expertise includes multiple services specializing in the area of non-sterile liquids.

- **Selection of excipients and review against IID** is vital when developing liquid dosage forms because they affect drug stability, solubility and taste. Excipients may be used to control release of the Active Pharmaceutical Ingredient (API). The excipient is then reviewed against the Inactive Ingredient Database (IID), a listing of previously approved excipients maintained by the FDA. If the excipient is listed the drug product may require a less extensive review process compared with a new excipient formulation.

- **Pharmaceutical Deformulation of Innovator** is the technical term for reverse engineering the separate components that make up the drug composition. This process is required to receive FDA approval for commercialization. The knowledge gained from this process produces the information necessary to reformulate the bio-equivalent product. The results are matched to properties of a Reference Listed Drug (RLD) to demonstrate bioequivalence. The FDA requires this procedure in order to consider approval to market a generic drug product.
Stability Studies play a central role in drug development. Stability is important to ensure the drug product delivers the benefits promised and to maximize consistent quality over the product shelf life under various environmental conditions. Solution Stability studies determine how the product should be stored to maintain effectiveness. Solid State Stability tests predict the behavior of solid formulations to optimize packaging options and storage conditions. The International Conference on Harmonization (ICH) Photostability Testing evaluates the light sensitivity of the drug to improve instructions for handling, packaging and labeling. Thermal cycling stability tests determine the effects of temperature variation that affect drug shipping and storage conditions.

Tests for Inherent Properties provide an understanding of the behavior of the drug product under different physical conditions including rates of absorption, distribution, metabolism and excretion. Testing for pKa determines the strength of an acid in solution. LogP and LogD testing determines drug-likeness while Intrinsic Dissolution Rate (IDR) testing measures the dissolution rate of a pure pharmaceutical active ingredient under constant conditions.

Excipient Compatibility tests evaluate interactions between the drug and components in the pharmaceutical formulation. For solutions and suspensions, results help determine buffer selection and measure the optimum pH level.

Process Development and Optimization

Process development and optimization services are designed to maximize efficiencies in the manufacturing process resulting in reduced cost and increased productivity.

Well-designed tests conducted from the beginning of the pharmaceutical formulation stage may help contain costs and increase efficiency during the manufacturing phase. Testing is established to evaluate equipment optimization, operating procedures and control mechanisms. The WDPrx team critically examines whether equipment utility is maximized, how output varies between people or operating shifts and if procedures and practices function as designed.

Cleaning Validation procedures are designed to assure that residues are removed from equipment and that cleaning supplies are suitable and appropriate for their purpose.
Analytical Method Development and Validation

Analytical method development services and validation are required by regulatory authorities to demonstrate that testing during the development process is appropriate for the intended use of the drug product. Pharmaceutical analytical services establish the identity, purity, physical characteristics and potency of the drug formulation. The range of pharmaceutical laboratory testing and subsequent results analysis involves collaboration between the WDPrx Quality Control department and the Research and Development Analytical team.

Results of analytical method development tests assess prototype formulations, determine product stability, discover batch-to-batch variability, verify USP methods and enable transfer of analytical procedures.

Validation

The correctness of the scientific method used to conduct studies and tests is known as validation. The development of any pharmaceutical drug product relies on precise scientific methods to confirm the correct substance appears in the correct amount and in the appropriate range for the intended purpose. WDPrx follows written standard operating procedures (SOP) describing each process for conducting method validation. Instruments are carefully calibrated and test methods are conducted according to an approved protocol plan.
Scale-Up

Scale-up determines best practices to increase production for sales and distribution requirements.

Increasing manufacturing output to achieve production quantities requires a skillful combination of experience, science and engineering. The process involves three important considerations: pre-production issues, concerns during production and post-production circumstances. Acquiring an adequate supply of the API and all raw materials must be assured in advance for successful scale-up. Each step in the production process must be evaluated to avoid issues when changing from small-batch to full production quantities. Data is collected from small-scale production runs that may yield important information that streamlines full-scale production methods. As each successive batch is manufactured, process ranges are identified that are documented according to an approved protocol written in advance of full-scale production. Scale-up procedures must adhere to strict regulatory requirements. The Scale-Up And Post-Approval Changes (SUPAC) guidelines are set by the FDA to determine whether changes are needed to the established manufacturing process. Prescription New Drug Application (NDA) and Abbreviated New Drug Application (ANDA) filings must also be submitted for government approval.

Technology Transfer
The efficient transition of technical and manufacturing capabilities between separate entities is known as technology transfer.

Whenever technology or production is shifted from one entity to WDPrx, a transition team with specialized experience evaluates all capabilities from raw materials through production to assure a successful outcome. A comprehensive check-list is completed to help ensure client satisfaction.

The team examines original pharmaceutical formulations, production methods and equipment that may require modification to machinery and procedures within the WDPrx facility. Additional training may be required. Documentation must be complete including up-to-date production records and SOP protocols concerning processing, packaging and cleaning. Analytical testing methods must also be reviewed for completeness and compatibility with SUPAC guidelines. At times, assistance from the previous manufacturer is sought if available to reduce cost and acquire insights helpful in the production process. WDPrx submits regulatory filings confirming the required expertise and capabilities to complete the transfer. Packaging line trials and a health and safety review are conducted.

Technology transfer involves a dedicated WDPrx team committed to eliminating potential problems that may arise at the point of origin with the goal of establishing a timely, safe and effective program for starting or continuing production of pharmaceutical drug products at WDPrx.

New Drug Application (NDA) and Abbreviated New Drug Application (ANDA) Support
WDPrx streamlines the process for regulatory documentation submission and approval.

Since 1938, every new drug must receive an approved New Drug Application from the FDA prior to U.S. commercialization. WDPrx offers New Drug Application (NDA) support by providing details about drug ingredients, manufacturing, processing and packaging.

The most sophisticated development and manufacturing processes remain idle until approval is received from federal and other regulatory bodies to begin production in the United States. The WDPrx regulatory affairs team brings years of experience successfully completing and submitting documentation to benefit clients. Complex filing requirements are submitted correctly the first time, reducing delay and costly additional filing corrections or changes. An authorized U.S. agent, WDPrx has a wealth of experience with a wide range of documentation to help manage the regulatory process from development through packaging, labeling and distribution.

Related Material

White Paper: The Single Most Overlooked Factor For Technology Transfer Success