



Fresenius Kabi Product Partnering

Who We Are

Fresenius Kabi Product Partnering is a global leader in the contract development and filling & finishing of sterile pharmaceuticals as well as for the development and supply of medical devices. Being part of Fresenius Kabi, we offer our customers access to the expertise of more than 20 innovation and manufacturing centers. Unparalleled production capabilities, outstanding quality compliance, and an excellent track record in contract manufacturing have made Fresenius Kabi Product Partnering the supplier of choice of an impressive number of pharmaceutical companies.

The integral concept of combining development and production for sterile medicinal products and develop additionally the respective medical devices for your application makes us a one-stop-shop for nearly every kind of project.

Scope at a Glance

Sterile Filling & Finishing

- IV-bags
- Bottles
- Vials
- Ampoules
- Pre-filled syringes
- Customized containers
- Glass
- Plastic
- Solutions
- Emulsions
- Liposomes
- Aseptic filling
- Terminal sterilization
- Lyophilization
- (Potent) API's
- Biologics
- Clinical supplies
- Full commercial scale
- Worldwide markets

Mission

"...to enable our Partners to market their parenterals and medical devices by providing tailor made assistance in the development, registration, and manufacturing of their products ..."

Manufacturing Locations

- Argentina
- Austria
- Brazil
- Czech Rep.
- China
- France
- Germany
- India
- Italy
- Mexico
- Norway
- Poland
- Portugal
- South Africa
- Spain
- Sweden
- USA

Services & Support

- Laboratory services
- Regulatory
- Shipping & Distribution

Medical Devices

- Research & Development
- Tool design & Construction
- Injection molding
- Pre-assembly / Final assembly
- Series production
- Packaging & Sterilization

Development Support

- Formulations
- Disposables
- Delivery systems
- Drug improvement
- Process optimization
- QC-methodology

Other Products/ Services

- Lipids
- Phospholipids
- Lactulose
- Hydroxyethyl Starches
- Secondary packaging
- Ointments, droplets
- Tablet blistering
- Oral Solid Dosage Form

Contacts

Sterile Pharmaceuticals

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Sterile Medical Devices

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Toll Manufacturing

Fresenius Kabi Product Partnering covers over 20 Fresenius Kabi manufacturing facilities and innovation centers operated in strict conformity with international quality standards (FDA-GMP, EU-GMP, cGAAP, WHO-GMP, Medical Device Regulations). New products are evaluated by means of an initial feasibility study in which the best fit between client (location, required services), product (process requirements, product size, markets), and facility (location, on-site technology and support toolbox) is determined. The development phase and the implementation of commercial manufacturing is supported by a dedicated project team and time-to-market is minimized by an efficient development and qualification program. Validations, stability studies, regulatory support and all other elements relevant to a specific product are brought together in a single project plan in close co-operation with the customer.

Services

- Filling and finishing of IV-bags (large and mini bags), bottles (glass and plastic), vials (glass and plastic), ampoules (glass and plastic), pre-filled syringes (glass and plastic), cartridges, customized containers
- Aseptic processing, terminal sterilization, lyophilization
- Development and supply of tailor made medical devices
- Processing of solutions and disperse systems such as emulsions and liposomes
- Full analytical, microbiological, pharmaceutical and regulatory assistance
- Worldwide logistic support

Manufacturing Locations





Medicinal Products Manufacturing / Containers / Support

The business approach of Fresenius Kabi Product Partnering is to provide our customers integral support throughout the life-cycle of their parenteral products: starting at the early stages through to full commercial scale, covering development as well as filling & finishing, supporting worldwide markets. A focus on continuous improvement and innovation thereby keeps the product tailored to customer demands, regulatory requirements, and market conditions at all times! Also an integral combination of medicinal products and medical devices can be offered to fit your special needs for highest quality products and most convenient application.

Manufacturing Technologies

- Aseptic preparation and filling
- Terminal sterilization
- Emulsion & liposome technology
- Oral solid dosage forms
- Lyophilization
- Oxygen free processing
- State of the art packaging and labelling for all container forms

Container Technologies



Type	Pre-filled syringes	Ampoules	Vials	Bottles	IV-bags	Multi-chamber bags	Specialty Devices
Size	1-50mL	1-20mL	1-100mL	50-1,000mL	40-5,000mL	100-5,000mL	1mL-200L
Material	Glass Plastic	Glass Plastic	Glass Plastic	Glass Plastic	Non-PVC PVC	Non-PVC	Various

Support Services

- Laboratory services
- Development & regulatory support
- World wide logistic support



Fact Sheet (4)



Medical Devices

Product safety, innovation and cost effectiveness are the key elements of our philosophy. Our two locations in Germany act here as R&D/engineering, tool shop and injection moulding, while our manufacturing plants in Poland and China provide ready-to-use products the most efficient way according to the ISO-standards and FDA regulations.



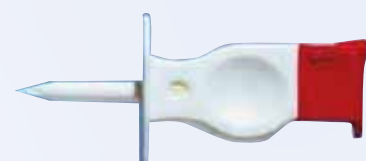
Services

- Fresenius Kabi considers a vertically integrated product development as an integral part for innovative product design.
- Highly qualified employees develop new product ideas for large-scale and applicable serial production item with the support of computer-aided design in a in a very short time frame.
- Immediate feedback with the in-house tool-making department enables a time-saving realization of preliminary product series for market research as well as alteration of already existing serial products.
- Our fully and semi-automatic production sequences offer us the opportunity to compete best in a modern market with quickly changing demands - in a flexible and cost-saving manner.
- To complete the service we provide all necessary documents for registrations all over the world.

Products

Our primary activities comprise subsequent scopes:

- IV therapy
- Appliances for pharmaceutical application
- Diabetes care
- Enteral feeding





Fact Sheet (5)

freeflex®: The Innovative IV-Bag

As leader in infusion and nutrition therapy, Fresenius Kabi is one of the largest and most capable manufacturers of IV-bags in the world. Our expertise in this area is continuously challenged by our drive to develop even better products than already available: safer for the patient, more convenient to handle at the hospitals, more environmentally friendly.

Freeflex®, Fresenius Kabi's innovation bag, represents an improvement in all of these areas! Freeflex® is an IV-bag of unparalleled qualities using state-of-the-art, fully integrated manufacturing processes. Freeflex® is an entirely PVC-free bag-system that shows out-standing drug compatibility at an extended pH interval and is extremely user-friendly.

The development of Freeflex® puts Fresenius Kabi Product Partnering in an even better position to tailor our service exactly to the needs and wishes of our clients!

freeflex®: The advantages

- Easy Handling
- Enhanced Safety
- Excellent Drug Compatibility
- Environmentally Friendly

freeflex®: In a nutshell

Container sizes ranging from 50ml up to 1000ml

Strong and resistant central hanger

High strength of welded seam enabling the use of pressure cuff

Safe and simple reconstitution avoiding any airborne contamination using the Freeflex® transfer device

Multi-layer PP primary bag film, free of PVC, plasticizers, additives or glues, with excellent (!) drug compatibility at a large pH range, low gas and water (!) vapour permeability, high transparency, and resistant to sterilization at 121 °C

Easy to remove, peelable overwrap

Tamper evident break-off ports with sterile chamber. Easy to identify and easy to open. Due to a special design of the ports, leakage is prevented, even after the removal of the administration set.

freeflex®: Award winning

Freeflex Wins Top French Award for Innovation

Fresenius Kabi's revolutionary non-PVC intravenous fluid and drug combination delivery system, Freeflex®, now available in the UK, has been awarded the top accolade for innovation by leading independent hospital physicians and pharmacists in France.

Taken from www.inside-hospitals.co.uk



HESylation Innovative Drug Delivery

Innovative formulation and drug delivery play a crucial part in optimising drug characteristics, such as pharmacodynamics, side effect profiles or water solubility.

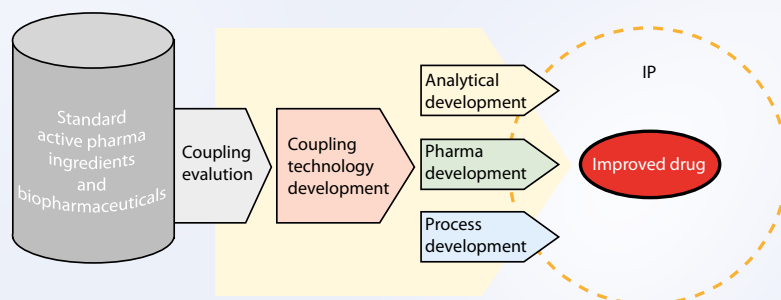
Fresenius Kabi has developed a new drug delivery technology with superior properties: the HESylation technology.

HESylation utilises hydroxyethyl starch ("HES") derivatives linked to drug substances in order to modify the drug characteristics. This modification enables the prolongation of the circulation half-life by increasing the stability of the molecule, as well as by reducing renal clearance, resulting in an increased biological activity.

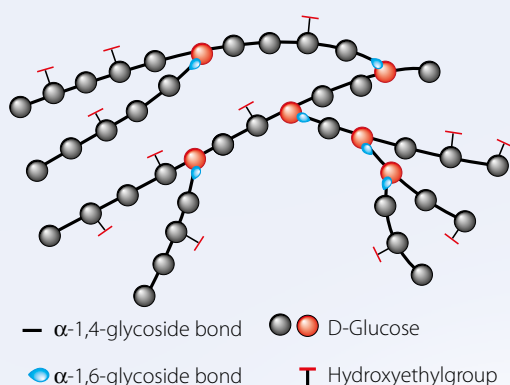
Fresenius Kabi has a broad portfolio of patents and patent applications covering coupling chemistry, special linkers and HESylated drugs on a target-by-target basis.

HESylation: the objectives

- **Enhanced Therapeutic Value through**
 - Extended circulating life
 - Improved efficacy
 - Reduced toxicity
 - Reduced immunogenicity
 - Improved solubility
 - Improved stability
- **Life Cycle Management through**
 - Patent prolongation
 - Proprietary patent position for (new) targets



HESylation: the polymer



HydroxyEthyl Starch (HES)

- A modified natural carbohydrate polymer derived from waxy maize starch
- Widely used in clinical practice for many years a/o as a blood plasma volume expander and in hemodilution
- Outstanding safety and biocompatibility record
- Various coupling strategies to target molecules available f/i through lysine, cysteine, terminal amino, or glyco-structures
- Molecular characteristics of HES can be varied through well controlled processes

HESylation: the target

- **Large therapeutic molecules such as**
 - Proteins
 - Peptides
 - (other) biomolecular therapeutics
- **Small molecule drugs**



Pre-Filled Syringes

Convenient - Safe - Efficient:

Fresenius Kabi adds pre-filled syringes to its container portfolio

Pre-filled syringes (PFS) have a lot of advantages over conventional containers for drugs for injection and enjoy excellent market acceptance. Sales of PFS have been growing at rates in the double digits for the last few years, partly driven by the introduction of increasing numbers of biotech drugs. This is leading to a growth in importance of the parenteral route of drug application. Pre-filled syringes cut out the transfer of the drug from the ampoule or vial to the syringe - this saves some work for the person applying the drug, and it also saves (waste) material. A bigger saving results when the drug itself is expensive (e.g. proteins): Conventional containers have to be overfilled to allow for losses in the transfer to the syringe, whereas PFS deliver the correct dose reliably with significantly less overfill. Taken together, these savings can more than offset the higher production costs of PFS compared to other



Safety is also an issue, both for the healthcare professionals and the patients. Handling of needles, syringes and ampoules is well known as a source of the small accidents that expose healthcare workers to drugs and/or infection. Healthcare employers worldwide are under pressure to reduce these risks to their staff, and PFS are an obvious improvement. For the patients, PFS also reduce the risks of contamination of the drug and cross-infection. Also, because the final container used to administer the drug to the patient is clearly labeled, PFS eliminate risks of misidentification and mix-ups, which are particularly dangerous when highly potent drugs are in play. Because of this ease and safety of use, PFS can be made in versions suitable for self-administration, making them an ideal response to the growing demand for home-use products.

PFS are available in small formats containing drugs for injection and also in larger sizes that can be used to deliver infusion solutions via pump systems. Syringes with volumes larger than 20ml have become available in the last years due to new plastic materials like COP and COC. These new materials combine the visual appearance and transparency of glass with the advantages of plastic.

To be at the forefront of these developments, Fresenius Kabi is cooperating with established partners to set up a syringe filling line at its plant in Graz, Austria. The facility is being laid out to aseptically process plastic and glass syringes from 0.1 to 50ml using state-of-the-art isolator technology.

Development and commercial manufacturing of solutions and emulsions are available for third parties and we will be glad to discuss any project with potential partners.

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Macromolecules with Focus on Polysaccharides



The Fresenius Kabi Austria plant at Linz has more than 60 years of experience in the development, manufacturing and analytics of polysaccharides. This makes us the partner of choice for your macromolecule-related projects.

cGMP and Contract Manufacturing/ Analytics

The Linz site is equipped for production as well as analytics of gram to multi-kilogram quantities, and can supply both simple and complex polysaccharides for any scale from early clinical trials to large-scale production.

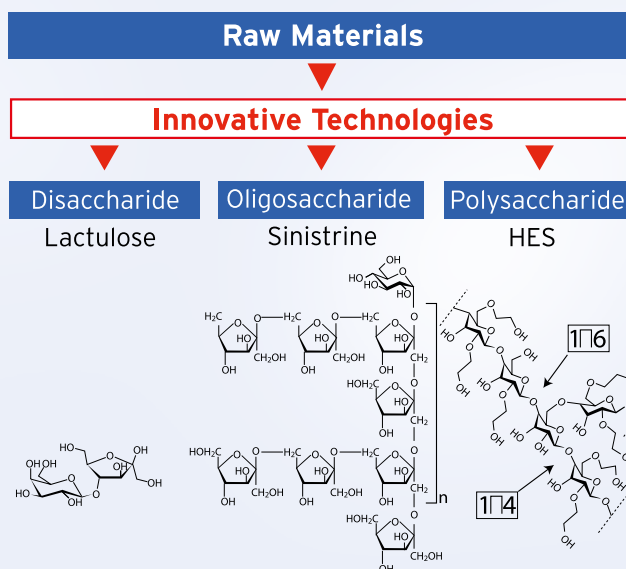
Our site complies **with all international regulatory standards.**

Capabilities

- Carbohydrate binding
- Carbohydrate interaction
- Carbohydrate synthesis
- Carbohydrate derivatization
- Carbohydrate tailoring
- Polysaccharide binding
- Polysaccharide interaction
- Polysaccharide synthesis
- Polysaccharide derivatization
- Polysaccharide tailoring
- Glycosylation
- Fluorescein marking

Technologies

- Lab/Pilot scale (up to 200 L / 30 kg)
- Commercial scale (up to tons)
- Multi-purpose & dedicated vessels
- Evaporation (up to 200 L)
- Microfiltration
- Ultrafiltration (up to 1000 L)
- Desalination
- Drying
- Lyophilization bulk/ vials
- Milling (up to 50 kg)
- Packaging



Our Service

- Synthesis of lab-scale polysaccharides
- Production of pilot-scale polysaccharides, including engineering scale-ups to industrial production processes
- Chemical modification of carbohydrates
- Customizing polysaccharides for narrow polydispersity using membrane separation technology, like ultrafiltration or nanofiltration
- Pilot-scale production of bulk pharmaceutical intermediates and ingredients, as well as API's based on carbohydrates
- Derivatization of carbohydrates for engineering of physico-chemical properties
- Fluorescein marking for diagnostic applications
- Production of tailor-made linkers for HESylation of Active Pharmaceutical Ingredients
- Analytics like the special HPAEC-PAD as well as routine GPC
- Regulatory support, compilation and support with filing all relevant documentation



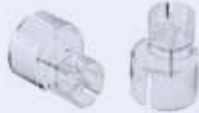
Transfer Devices

Fresenius Kabi transfer devices are designed to transfer liquids from one container to another in the safest and easiest way.

Fresenius Kabi offers various spike systems - from simple double-sided plastic spikes, which can be used on a large variety of containers, up to covered needle spikes, which are surrounded by a plastic housing providing a high degree of protection against injuries.

The basic forms are not dedicated to special containers. However, we offer dedicated transfer systems, which provide a fixed and stable snap connection to the bag port or vial/ bottle cap. This feature is especially important for the application of cytotoxic drugs.

Our team of development engineers is ready to take on any challenging development task, such as creating a transfer device tailor-made for your application and the corresponding container, in order to provide the optimum solution for your requirements.

Basic transfer devices	Dedicated transfer devices for Fresenius Kabi containers	Dedicated transfer devices for diverse containers
<p>Variable usage on many different containers</p> <p>Examples:</p> <ul style="list-style-type: none"> • Basic form with double-sided plastic needle • Micro spike for small vials with needle-free luer lock connection to the syringe 	<p>Connection with a dedicated container</p> <p>Examples:</p> <ul style="list-style-type: none"> • KabiPac adapter • Freeflex adapter 	<ul style="list-style-type: none"> • Connection with a dedicated container and bottle • Customized development

