Improving the Delivery of Topical Ocular Drops

Using semifluorinated alkanes to transform poorly soluble drugs into effective therapeutics.

BY BERNHARD GÜNTHER, CEO, NOVALIQ GMBH

Novaliq GmbH, based in Heidelberg, Germany, is a drug delivery company that is developing a superior generation of ocular formulations for poorly soluble drugs. The patented ocular formulations are based on semifluorinated alkanes (SFAs), which can be easily applied in the form of eye drops or an eye spray.

Since its establishment in 2007, Novaliq has obtained four rounds of funding totalling €13.2 million from its major shareholder, Dievini Hopp Biotech Holding (a venture capital company focusing on biopharmaceutical companies in Europe). This funding is anticipated to support the company until 2015.

BUSINESS STRATEGY

To make full use of the vast potential of this novel drug delivery platform, Novaliq plans to continuously expand the range of ocular indications. The company will develop existing product candidates that it will guide through clinical Phase I/II testing. Due to the company's focus on superior drug formulations with well-established drugs, Novaliq's pipeline projects have low failure risks and high projected values. For further development and commercialization, Novaliq intends to license these formulations to suitable partners.

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In addition, Novaliq has started a short-term registration process to apply for CE approval of over-the-counter eye drops for the treatment of dry eye disease. These drops make use of the excellent wettabilty and biocompatibility of SFAs on the cornea. The company also intends to seek partners for this product opportunity in the near term.

THE TECHNOLOGY

EyeSol

EyeSol is a novel topical ocular drug delivery system for poorly soluble drugs. Although the anterior segment of the eye is one of the most readily accessible organs of the body, drug delivery to the eye tissues is particularly problematic. This is reflected by the notoriously poor bioavailability of topical ocular drug formulations of 5% or less.[1] A standard drop of water of approximately 40 to 50 µL will activate the

blinking reflex, which washes away most of any topically administered dose within 15 to 30 seconds after instillation.

To further complicate matters, up to 75% of new chemical entities (NCEs) are considered poorly soluble, even for oral administration. In short, a drug is considered poorly soluble if the required dose cannot be dissolved in 250 mL of aqueous medium. An aqueous eye drop has a volume of 40 to 50µL, 5,000 times less volume. This exacerbates the solubility problem by several orders of magnitude.

Three major issues need to be addressed for ocular formulations: safety, bioavailability, and stability. EyeSol, Novaliq's proprietary ocular drug delivery technology, fulfills these requirements. EyeSol is based on an SFA platform. SFAs are a special class of fluorocarbon compounds that have been used for more than 10 years in the posterior segment in thousands of patients with an excellent safety profile.[2,3] Their low viscosity and surface tension result in much smaller droplets of around 15 µL, approximately three times less than a standard aqueous drop. Thus, SFAs avoid the spillover effect (and the subsequent loss of most of the administered dose), which obviously increases their bioavailability. In addition, the refractive index of SFAs is similar to water, so these formulations will not impair patients' vision like emulsions and oily drops tend to do. Due to their amphiphilic nature, SFAs dissolve a number of therapeutically relevant, poorly-water-soluble compounds such as cyclosporine A and Tacrolimus. Moreover, the aqueous-free environment of this delivery system increases drugs' stability by preventing oxidation and hydrolysis..

CyclASol

CyclASol is the first Cyclosporine A solution for dry eye disease. This proprietary SFA product is based on the EyeSol technology and therefore provided preservative-free in multidose units. The absence of surfactants and irritating preservatives that tend to blur patients' vision leads to improved tolerability and convenience.

Summary

Novaliq GmbH offers a compelling drug delivery opportunity to enhance the performance of topical eye drops. A new generation of products is possible through the unique and proprietary properties of SFAs as the delivery vehicle.

Novaliq welcomes invitations from interested parties to enter discussions about significant additional development opportunities under a confidentiality agreement. ●

CyclASol is investigational and not approved for use in the USA.

1. Sahoo SK, Dilnawaz F, Krishnakumar S. Nanotechnology in ocular drug delivery. *Drug Discov Today*. 2008;13(3-4):144-151.
2.Kirchhof B, Wong D, Van Meurs J, et al. Use of perfluorohexyloctane as a long-term internal tamponade agent in complicated retinal detachment surgery. *Am J Ophthalmol*. 2002;133(1):95-101.
3.Meinert H, Roy T. Semifluorinated alkanes--a new class of compounds with outstanding properties for use in ophthalmology. *Eur J Ophthalmol*. 2000;10(3):189-197.

FAST FACTS

LOCATION

Heidelberg, Germany; www.novaliq.de

PRODUCT

- Topical drug delivery technology
- CyclASol, a 0.05% clear, preservative-free, multidose Cyclosporine A solution

UNIQUE CHARACTERISTICS

CyclASol is a crystal-clear, preservative-free, multidose solution with no blurring. In rabbit corneas, it has shown long-term stability and superior wettability, superior pharmacokinetics, and superior biocompatibility compared with emulsions.

SFAs have the potential to create significant competitive advantages with multiple drug candidates in ocular conditions, primarily by enhancing the therapeutic effect of poorly soluble drugs.

APPLICATIONS

Dry eye disease and other ocular indications

MARKET SIZE POTENTIAL

$3 billion

REGULATORY STATUS

Phase 1 clinical development; preclinical trials completed. Not yet approved in the US or other countries.

HOW MUCH MONEY IS NEEDED FOR APPROVAL

€ 15 million

MANAGEMENT TEAM & CONTACTS

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