Innovative Partner for Product Development
BioTeSys: Modern in vitro testing methods save time and money

Esslingen, 03.05.2006 - New legal standards and guidelines (such as the 7th amendment of the Cosmetics Directive) mean more than simply adopting new basic testing principles, since many older substances will have to be retested. Earlier testing methods involving the use of live animals are hardly able to meet these new challenges; furthermore, the value of extrapolating the results of such tests to humans is limited. Cellular test systems represent an alternative to these methods, particularly during the critical product development stage — critical, because this stage lays the foundation for the product's later success. BioTeSys of Esslingen, Germany, offers its customers both proprietary and commercially available in vitro test systems that have been specially developed for performing fast, economical product evaluations and for assessing the potential of new active agents.

If a new product is to be successfully positioned on the market, the development phase is of crucial importance. Yet this very development process is now subject to a variety of EU directives and regulations that have resulted in new, far-reaching changes to the legal framework, particularly over the past few years.

These changes, however, have resulted in opportunities for implementing new technologies, especially when it comes to in vitro testing systems. In vitro testing — an umbrella term which describes test systems based on cell cultures — opens up novel approaches to assessing the potential efficacy of active agents, and these approaches minimize time and expense. This type of testing can include anything from detailed studies of cellular interactions to simple screening tests. The latter are an especially interesting way of performing routine studies or of quickly and economically assessing the potential of test substances or mixtures of substances. These aspects of in vitro testing approaches are particularly remarkable, because screening, as it is understood here, involves testing and classifying substances with regard to a specific, defined effect. Substances are screened at different concentrations and in various proportions with the goal of producing statistically robust results.

The BioTeSys in vitro testing systems presented here help provide answers to questions ranging from the simple to the highly complex. Simple questions, for instance, would be those concerning cytotoxicity, phototoxicity, antioxidative capacity or bioavailability, which would indicate the feasibility of working with a given cell type. If it is found that interactions between different cell types (e.g., dermal fibroblasts, keratinocytes) play a role in assessing a particular physiological effect, a co-culture or organotypical model can be substituted. BioTeSys has years of experience with organotypical models, particularly for dermatological applications. In addition to its established, commercially available models (e.g., CellSystems, SkinEthics) and the testing options associated with them (such as tests for the corrosive effects of individual substances, mixtures and finished products on the skin), BioTeSys has also developed two specific test models: an atopic dermatitis model and a melanocyte model. A key advantage to these is that, depending on the specific question, both models can be viewed at different levels of complexity: as either a 2-dimensional, co-culture model or as a 3-D, organotypical model. Two-dimensional, co-culture models are especially suited to answering a variety of questions, and carry with them the additional advantage of being quick and cost-effective.

The Atopic Dermatitis Model: Eczematous skin conditions, such as atopic dermatitis and contact allergies, belong to a very heterogeneous group of inflammatory skin diseases manifesting typical clinical symptoms (itching, inflamed redness and scaling). In order to simulate this syndrome in vitro, BioTeSys has developed models that allow researchers to reproduce the clinical manifestations of atopic dermatitis, both morphologically (disruption in the epidermal barrier, see fig. 1) and through the expression of specific markers (degradation of E-cadherin, expression of ICAM-1, NT-4, selected cytokines). From here the efficacy of therapeutic substances can be assessed. To accomplish this, activated immune cells, which play a key role in the pathogenesis of this disorder, were integrated into a co-culture with keratinocytes and into the three-dimensional structure of a skin model.

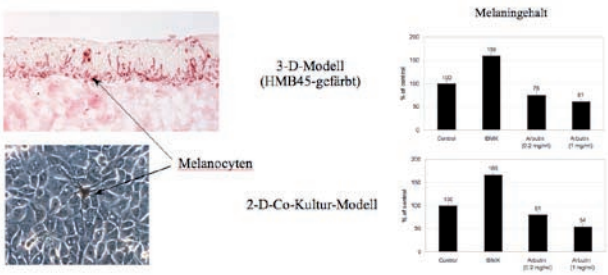

Fig. 1: Effect of activated immune cells on the disruption in the epidermal barrier (spongiosis) in the 3-D and 2-D, co-culture model.

The Melanocyte Model: In order to perform in vitro studies on substances that have a regulatory effect on skin pigmentation, BioTeSys developed a two-dimensional, co-culture model consisting of melanocytes and keratinocytes, and a pigmented 3-D skin model. Both models allow researchers to study how substances regulate skin pigmentation, as has been successfully shown with known regulators (3-isobutyl-1-methylxanthine, i.e., IBMX, increases pigmentation; kojic acid and arbutin decrease pigmentation). In terms of melanin production by melanocytes, the results from the 2-D co-culture model were comparable to those generated by the 3-D model (fig. 2).

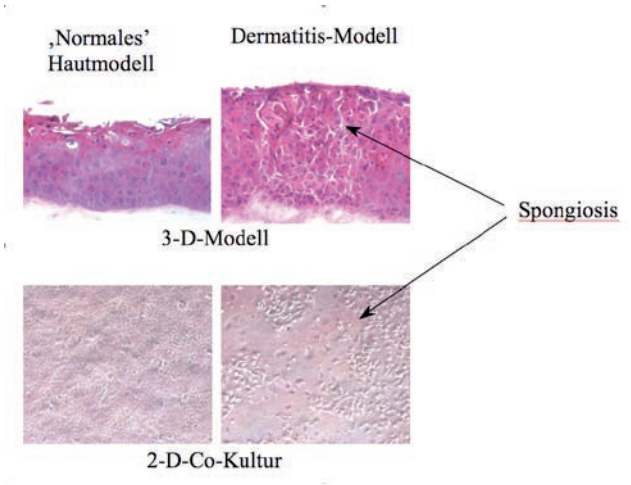

Fig. 2: Melanocyte model both as a 3-D model (melanocytes stained with HMB45) and as a two-dimensional, co-culture model; melanin content measured after different treatments.

In general terms, in vitro testing approaches — which are described here in a heavily abbreviated form — are fast, cost-effective methods for assessing potential efficacy. They make it easier for researchers to further develop product concepts, especially when these are based on the effects that mixtures of substances can have. Similar advantages apply when assessing the potential of new active agents. The results of either approach provide customers with valid data for characterizing and positioning their products on the market.

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Über BioTeSys GmbH:
BioTeSys GmbH in Esslingen (www.biotesys.de) was founded in 1999 and is a spin-off of the Institute for Biological Chemistry and Nutritional Sciences at the University of Hohenheim. BioTeSys is a partner for development and conversion of new concepts in the areas cosmetics, food, and pharmaceuticals (OTC). The spectrum covers screening procedures for the collection of the bioactive potential of substances or substance mixtures, in vitro testing using single cell cultures, co-cultures and different organ models as well as clinical studies. The department of analytics which focuses on HPLC and photometry, is accredited to DIN EN ISO/IEC 17025. All analytical procedures and test parameters used are based, developed and optimised according to physiological guidelines. The results and raised property concentrations therefore denote a direct significance for the estimated biological effects.
As complete service provider in the area of the biological and chemical analysis, the company offers extensive services including the development of new procedures and products for the customer.