# **EPISKIN** World leader in tissue engineering

FOR IN VITRO TESTING



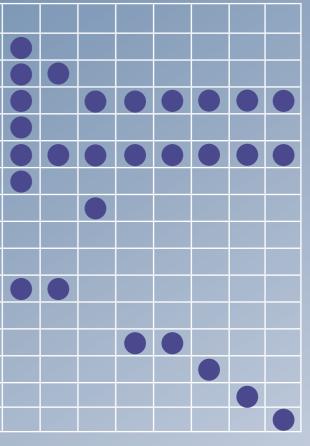
## APPLICATIONS

Skin irritation	
Skin corrosion	
UV exposure	
Bacterial adhesion	
DNA Damage	
Omics	
Permeability	
Eye irritation	
Medical Devices	
Microbiome	
Skin immune response	
Pigmentation/Depigmentation	
Oral & Gingival care	
Oesophageal Irritation	
Bladder irritation	
Vaginal irritation	

## SUMMARY

T-SKIN<sup>™</sup> / Reconstructed Full-Thickner SkinEthic<sup>™</sup> RHE / Reconstructed Hun SkinEthic<sup>™</sup> RHE-LC / Human Epidern SkinEthic<sup>™</sup> RHPE / Reconstructed Hu SkinEthic<sup>™</sup> HCE / Human Corneal Ep SkinEthic<sup>™</sup> HOE / Human Oral Epither SkinEthic<sup>™</sup> HOE / Human Gingival Ep SkinEthic<sup>™</sup> HOE / Human Oesophag SkinEthic<sup>™</sup> HBE / Human Bladder Ep SkinEthic<sup>™</sup> HVE / Human Vaginal Epi





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## EPISKIN: your reliable and trustworthy partner for your benefits

## We innovate

since 1992 for a better science in producing advanced, relevant and robust in vitro 3D models allowing our users to predict human response. Very strict and unique quality controls help us to supply unmatched quality models. Our innovation, your science.

## We deliver

nnovatior

## We dedicate

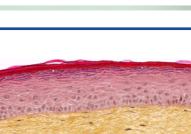
all our expertise, strengths and skills to be the world leader in tissue engineering for in vitro testing and research. No compromise. Our one and only core business is supplying advanced and relevant tissues to the scientific community and partnering with added value testing laboratories. Our commitment, your satisfaction.

Expertise

worldwide, serving all customers with our 3 partners in India, Korea and Japan and with our 2 subsidiaries in Brazil and China and our headquarters in France. You order, we deliver.

## ADVANCED 3D MODELS FOR A BETTER, MORE PREDICTIVE AND MORE ETHICAL SCIENCE







NAME

**T-Skin™** is an in vitro reconstructed skin which consists of a dermal equivalent with human fibroblasts overlaid by a stratified, well differentiated epidermis derived from normal human keratinocytes cultured on an inert polycarbonate filter.

This model exists at different stages of maturity.





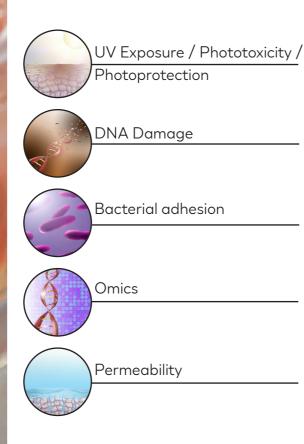
6-well plate



### APPLICATIONS

**Reconstructed Human** 

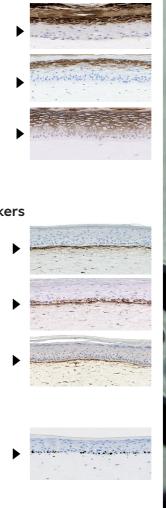
**Full Thickness Model** 



## SPECIFIC MARKERS

### **Differentiation markers:**

- Filaggrin Involucrin Loricrin
  - Cytokeratin 10
- Transglutaminase-1



### **Dermal-Epidermal junction markers**

- Collagen IV, VII, XII
- Laminin V
- Perlecan **BP** antigen



### **Proliferation markers**

Ki67

# **Reconstructed Human Full Thickness Model**

**T-Skin™** / Reconstructed Human Full Thickness Skin Model

### DESCRIPTION

### REFERENCES

Characterization of a New Reconstructed Full Thickness Skin Model, T-Skin™, and its Application for Investigations of Anti-Aging Compounds.

Bataillon M, Lelièvre D, Chapuis A, Thillou F, Autourde JB, Durand S, Boyera N, Rigaudeau AS, Besné I, Pellevoisin C. Int J Mol Sci. 2019 May 7;20(9):2240. doi: 10.3390/ijms20092240.

Characterization of a New Reconstructed Full Thickness Skin Model TSkin. Autourde JB, Bataillon M, Besne I, Boyera N, Chapuis Á, Durand S, Lelièvre D, Pellevoisin C, Rigaudeau AS, Thillou F. International Journal of Molecular Sciences.

Reconstructed skin to create in vitro flexible models of skin aging: new results and prospects.

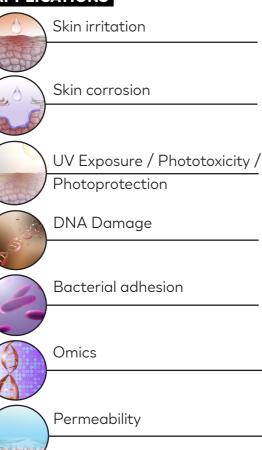
Asselineau D, Ricois S, Pageon H, Zucchi H, Girardeau-Hubert S, Deneuville C, Haydont V, Neiveyans V, Lorthois I, In Farage MA, Miller W, Maibach H, editors. Springer Berlin Heidelberg Textbook of Aging Skin p 1203-1228.

In vitro and in vivo studies with tetrahydrojasmonic acid (LR2412) reveal its potential to correct signs of skin ageing. Tran C, Michelet JF, Simonetti L, Fiat F, Garrigues A, Potter A, Segot E, Watson REB, Griffiths CEM, de Lacharrière O. JEADV, 28, 415-423.

NAME

# **Reconstructed Human Epidermis**

# FORMAT APPLICATIONS $0.5\ cm^2$ 4 cm<sup>2</sup> HTS 24-well plate 0.33 cm<sup>2</sup> Omics HTS 96-well plate 0.11 cm<sup>2</sup>



Medical Device

# RHE SkinEthic

# **Reconstructed Human Epidermis**



DESCRIPTION **SkinEthic<sup>™</sup> RHE** is an *in vitro* reconstructed human epidermis from normal human keratinocytes cultured on an inert polycarbonate filter at the air-liquid interface. It is histologically similar to the in vivo human epidermis.

Our strong believe in Science and our continuous improvement with ISO 9001 certification push us to keep improving the production process of our model: From cell extraction to reconstruction with chemically defined biocomponents and medium.

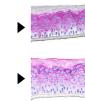
Every single biocomponent of each step of our production is clearly defined and their traceability is guaranteed. The process is then more secured, allowing to deliver a SkinEthic<sup>™</sup> RHE model more reproducible, robust and reliable than ever.

Different maturities and surfaces are available.

### SPECIFIC MARKERS

### **Differentiation markers:**

- Filaggrin
- Involucrin
- Loricrin
- Transglutaminase-1 Keratin 10 Keratin 5 CD44



Presence of different epidermal classes of lipids comprising ceramides

### **Dermal-Epidermal junction markers**

- Type IV collagen
- Laminin V Alpha6Beta4-integrin

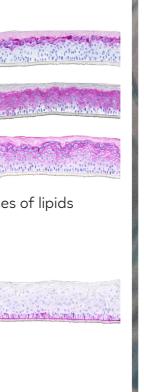
Proliferation markers Ki67

BP antigen

Cell Migration Model ^ММ SkinEthic

are epidermal models on an innovative insert. Epidermal or mucosal reconstructed on this insert are histologically similar to in vivo human epidermis and mucosa.

**SkinEthic<sup>™</sup> RHE** / Reconstructed Human Epidermis



## REFERENCES

Pre-validation of SENS-IS assay for in vitro skin Pellevoisin C, Cottrez F, Johansson J, Pedersen E, Coleman K, Groux H. Toxicology In Vitro (in review)

SkinEthic™ RHE for in vitro evaluation of skin Skinetnic<sup>m</sup> Rhe for in vitro evaluation of skin irritation of medical device extracts. Pellevoisin C, Videau C, Briotet D, Grégoire C, Tornier C, Alonso A, Rigaudeau AS, Bouez C, Seyler N. Toxicol In Vitro. 2018 Aug;50:418-425. Doi: 10.1016/j.tiv.2018.01.008. Epub.

In vitro patch test using non-invasive endpoints. De Brugerolle de Fraissinette A, Rosdy M, Tornier C. SOT.

A catch-up validation study on reconstructed human epidermis (SkinEthic RHE) for full replacement of the Draize skin irritation test. Alépée N, Tornier C, Robert C, Amsellem C, Roux MH, Doucet O, Pachot J, Méloni M, de Brugerolle de Fraissinette A. Toxicol In Vitro. 2010. Feb;24(1):257-66. doi: 10.1016/j. tiv.2009.08.024. Epub.

Malassezia colonisation on a reconstructed human epidermis: Imaging studies. Pedrosa AF, Lisboa C, Branco J, Almeida AC, Mendes C, Pellevoisin C, Leite-Moreira A, Miranda IM, Rodrigues AG. Mycoses. 2019 Dec;62(12):1194-1201. doi: 10.1111/ myc.13011. Epub.

Preliminary performance data of the RHE/IL-18 assay performed on SkinEthic(™) RHE for the identification of contact sensitizers. Andres E, Barry M, Hundt A, Dini C, Corsini E, Gibbs S, Roggen EL, Ferret PJ. Int J Cosmet Sci. 2017 Apr;39(2):121-132. doi: 10.1111/ics.12355. Epub.

# **Reconstructed Human Epidermis with** Langerhans Cells

### NAME

Cells

### DESCRIPTION

The SkinEthic<sup>™</sup> RHE-LC model is a standard epidermal model in which Langerhans cells progenitors have been integrated. During the tissue reconstruction, these immature cells have differentiated into antigen-presenting Langerhans cells expressing the specific marker CD207 (langerin). They are mostly located and evenly spread within the supra-basal epidermal layer. This model is therefore expected to be a useful tool for skin immune response studies.

### SPECIFIC MARKERS

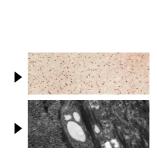
**RHE-LC** 

SkinEthic

### Langerhans cells markers:

CD207 Langerin 

**Birbeck** granules CD1 CD80 CD86 CCR7



### **Differentiation markers:**

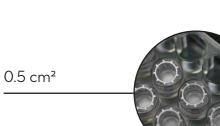
Filaggrin Involucrin Loricrin Keratin 10 Keratin 5

Presence of different epidermal classes of lipids comprising ceramides

### **Dermal-Epidermal junction markers**

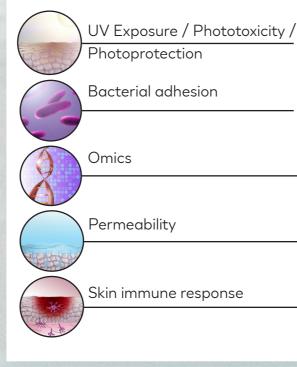
- Type IV collagen
- Laminin V ► Alpha6Beta4-integrin BP antigen

Proliferation markers Ki67



FORMAT

## APPLICATIONS



**Reconstructed Human Epidermis** 

with Langerhans Cells



SkinEthic<sup>™</sup> RHE-LC / Human Epidermal Model Langerhans

### REFERENCES

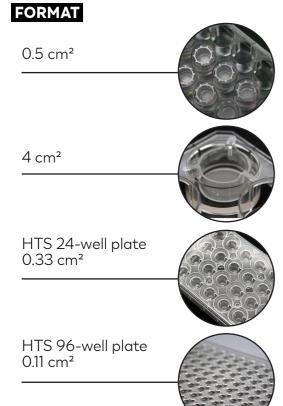
Adding the immune component in reconstructed human skin and eye epithelia models.

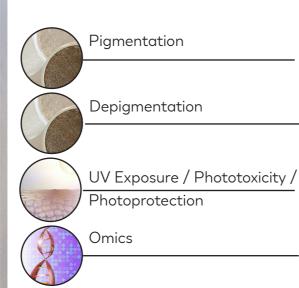
models. Ancelin N, Benas D, Brusq JM, Douillard G, Ligouis M, Meloni M, Mondoulet L, Ovigne JM, Pellevoisin C, Rigaudeau AS, Sahuc F, Segaud V. Poster Asiatox

Cellular mechanistic investigation on antigen delivery by Viaskin® patchfor epicutaneous immunotherapy with reconstructed human epidermis including Langerhans cells (SkinEthicTM RHE-LC). Dhelf V, Dioszeghy V, Ligouis M, Mondoulet L, Pellevoisin C, Sahuc F. Poster Poster

## **Reconstructed Human Pigmented Epidermis**

## APPLICATIONS

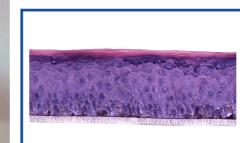












# **Reconstructed Human Pigmented Epidermis**

### NAME

### DESCRIPTION

The SkinEthic<sup>™</sup> RHPE model is composed of normal human keratinocytes cultivated in the presence of melanocytes of phototype II, IV or VI, localized in the basal layer.

The different tanning degrees of these constructs correspond macroscopically to 3 different phototypes of human skin.

### SPECIFIC MARKERS

Melanocytes localized in the basal cell layer interspersed with basal cell keratinocytes.



Melanin distribution in the basal layer

Ki 67

**SkinEthic<sup>™</sup> RHPE** / Reconstructed Human Pigmented Epidermis



### REFERENCES

Skin lightening effect of natural extracts coming from Senegal botanical biodiversity. Baillet-Guffroy A, Ĕl Khoury R, Lteif R, Michael-Jubeli R, Salameh D, Tfayli A, Zeitoun H. International Journal of Dermatology.

Reconstructed Human Pigmented Epidermis (RHPE): an in vitro model for the evaluation of melanogenesis. Sahuc F. SOFW Magazine.

Sepicalm VG, a new skin lightening enable to modulate melanogenesis-related genes and to prevent UV-induced pigmentation thanks to its soothing properties. Dumont S, Khaiat A, Puginier M, Stoltz C, Garcia C. SEPPIC

Melanocyte containing human organotypic epidermis as a model to evaluate toxicity of melanin binding substances. Straube F, Junker U, Kretz S, Wolf A. Society of Toxicology, USA.



### FORMAT









**Corneal Epithelium** 

### APPLICATIONS



**Bacterial Adhesion** 

Ocular Irritation

Omics



• Eye Irritation Test (EIT) Method validated by EURL-ECVAM and under OECD TG 492 for identification of chemicals not requiring classification for eye hazard (UN GHS)

- ▶ EIT implemented in the draft OECD GD for serious damage and eye irritation
- Corneal differential display i.e. mucin production

# HCE **S**kin**E**thic



# Human **Corneal Epithelium**



### DESCRIPTION

The SkinEthic<sup>™</sup> HCE model is composed of transformed human corneal keratinocytes cultivated on an inert polycarbonate filter at the air liquid interface in a chemically defined medium.

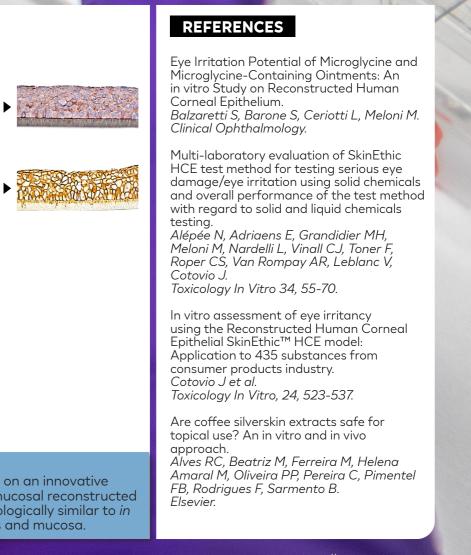
The reconstructed tissue forms a stratified and well organized epithelium which is structurally, morphologically and functionnally similar to the human cornea with presence of basal, wing and mucus production cells.

### SPECIFIC MARKERS

**Differentiation markers:** 

## Keratin

CD44 Hemidesmosomes





are epidermal models on an innovative insert. Epidermal or mucosal reconstructed on this insert are histologically similar to in vivo human epidermis and mucosa.

Dermis / Epidermis Epidermis

SkinEthic<sup>™</sup> HCE / Human Corneal Epithelium





### NAME

### DESCRIPTION

The SkinEthic<sup>™</sup> HGE model is composed of normal human gingival cells cultivated on an inert polycarbonate filter at the air liquid interface in a chemically defined medium.

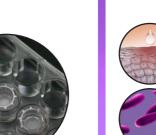
This model is histologically similar to the outer cell layers of the human gum.

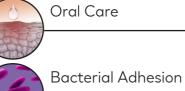
### SPECIFIC MARKERS

**Differentiation markers:** 

## FORMAT

0.5 cm<sup>2</sup>





APPLICATIONS

**Gingival Epithelium** 

Human



### Filaggrin Keratin 13 Ki67 CK10



# **Gingival Epithelium**

SkinEthic<sup>™</sup> HGE / Human Gingival Epithelium



### REFERENCES

Evaluation of an oral care product safety screening program utilizing the in vitro SkinEthic Human Gingival Epithelium (RHG) and Oral Buccal (RHO) models. Wurzburger L, Kazmi P, Re T, Alonso A, Bertino B, Barnes N, de Brugerolle de Fraissinette A, Hilberer A, Raabe H, Wilt N, Srinivasan V. SOT.

In Vitro Toxicity evaluation of toothpastes using reconstructed human oral and gingival mucosa models. Van de Vannet B, De Wever B, Bottenberg P, Cappadoro M. Presented at the Society of Toxicology, New Orleans, USA.

Characterization of human oral and gingival mucosal models: a histological characterization and applications in toxicity testing. Vande Vannet B and Hanssens JL, Free

University of Brussels. 3rd International SkinEthic Workshop Nice, France.

# HOF **S**kin**E**thic



# Human **Oral Epithelium**

### NAME

### DESCRIPTION

The SkinEthic<sup>™</sup> HOE model is composed of TR146 cells (derived from a squamous cell carcinoma of the buccal mucosa) cultivated on an inert polycarbonate filter at the air liquid interface in a chemically defined medium.

### SPECIFIC MARKERS

**Differentiation markers:** 

### Keratin 6 Keratin 16 CD44

Ki67





## Human **Oral Epithelium**

### FORMAT

0.5 cm<sup>2</sup>

HTS 24-well plate 0.33 cm<sup>2</sup>



APPLICATIONS



**Bacterial Adhesion** 

Omics

### Epithelia

SkinEthic<sup>™</sup> HOE / Human Oral Epithelium

This model forms an epithelial tissue devoid of stratum corneum, resembling histologically to the mucosa of the oral cavity.

### REFERENCES

Evaluation of an oral care product safety screening program utilizing the in vitro SkinEthic Human Gingival Epithelium (RHG) and Oral Buccal (RHO) models. Wurzburger L, Kazmi P, Re T, Alonso A, Bertino B, Barnes N, de Brugerolle de Fraissinette A, Hilberer A, Raabe H, Wilt N, Srinivasan V. SOT.

ALC: NOT THE REAL PROPERTY OF

A Biphasic Innate Immune MAPK Response Discriminates between the Yeast and Hyphal Forms of Candida albicans in Epithelial Cells. Moyes DL et al. Cell Host & Microbe, 8, 225-235.

Quantitative expression of the Candida albicans secreted aspartyl proteinase gene family in human oral and vaginal candidiasis. Naglik JR et al. Microbiology, 154, 3266-

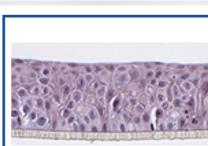
3280.

Phenotypic screening, transcriptional profiling, and comparative genomic analysis of an invasive and non-invasive strain of Candida albicans. Thewes S, Moran GP, Magee BB, Schaller

М

Sullivan DJ, Hube B. BMC Microbiol. 24;8:187.

# HO2E **S**kin**E**thic



# Human **Oesophageal Epithelium**

## NAME

### DESCRIPTION

**The SkinEthic<sup>™</sup> H02E** model is a human oesophageal epithelium composed of immortalized cell line Kyse 510, cultivated on an inert polycarbonate filter at the air liquid interface in a chemically defined medium.

oesophagus.

### SPECIFIC MARKERS

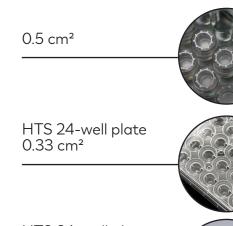
### **Differentiation markers:**

Keratin 6 Keratin 13





### FORMAT



HTS 96-well plate 0.11 cm<sup>2</sup>



APPLICATIONS

Oesophageal Irritation

**Bacterial Adhesion** 

SkinEthic<sup>™</sup> HO2E / Human Oesophageal Epithelium

This model forms an epithelial tissue devoid of stratum corneum, resembling histologically to he outer cell layers of the human



### REFERENCES

Influence of voriconazole and fluconazole on reconstituted multilayered oesophageal epithelium infected by Candida albicans. J.Bernhardt, H.Bernhardt, M.Knoke, K.Ludwig. Mycoses, 47, 7, p.330, October 2004.

Evaluation of Human Esophageal Epithelium Permeability in Presence of Different Formulations Containing Hyaluronic Acid and Chondroitin Sulphate. Gaia Pellegatta, Marco Spadaccini, Laura Lamonaca, Vincenzo Craviotto, Ferdinando D'Amico, Laura Ceriotti, Marisa Meloni, Alessandro Repici. Medical Devices: Evidence and Research 2020.

In Vitro Modelling of Barrier Impairment Associated with Gastro-Oesophageal Reflux Disease (GERD). Marisa Meloni, Paolo Buratti, Francesco Carriero, Laura Ceriotti. Clinical and Experimental Gastroenterology 2021.

Protective Mechanisms of Liquid Formulations for Gastro-Oesophageal Reflux Disease in a Human Reconstructed Oesophageal Epithelium Model. Laura Ceriotti, Paolo Buratti, Enrico Stefano Corazziari, Marisa Meloni. 2022.

# 



Human

## NAME

### DESCRIPTION

The SkinEthic<sup>™</sup> HBE model is a human bladder epithelium composed of immortalized cell line RT-112 (urinary bladder transitional cell carcinoma), cultivated on an inert polycarbonate filter at the air liquid interface in a chemically defined medium.

bladder.

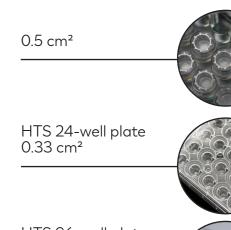
### SPECIFIC MARKERS

### **Differentiation markers:**

- Keratin 17
- Keratin 20
- ► CD44

# Human **Bladder Epithelium**

### FORMAT



HTS 96-well plate 0.11 cm²



APPLICATIONS





Omics



# **Bladder Epithelium**

SkinEthic™ HBE / Human Bladder Epithelium

This model forms an epithelial tissue devoid of stratum corneum, resembling histologically to the outer cell layers of the human



# HVE **S**kin**E**thic

100 0 000 10 0 11 50





### DESCRIPTION

The SkinEthic<sup>™</sup> HVE model is composed of A431 cells (derived from a vulval epidermoid carcinoma) cultivated on an inert polycarbonate filter at the air liquid interface in a chemically defined medium.

## Human **Vaginal Epithelium**

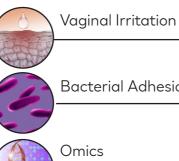
### FORMAT

0.5 cm<sup>2</sup>

HTS 24-well plate 0.33 cm<sup>2</sup>



APPLICATIONS



**Bacterial Adhesion** 



### SPECIFIC MARKERS

**Differentiation markers:** 

### Keratin

Involucrin 



### Epithelia

# **Vaginal Epithelium**

SkinEthic<sup>™</sup> HVE / Human Vaginal Epithelium

This model is histologically similar to the *in vivo* vaginal mucosa.





## REFERENCES

Integrated in vitro vaginal safety approach for bath and body wash products utilizing SkinEthic Human Vaginal Epithelium (HVE) model.

Vinayak S, Alonso A, Bertino B, Costin GE, de Brugerolle de Fraissinette A, Orak D, Inglis H, Kazmi P, Raabe H, Re T. SOT.

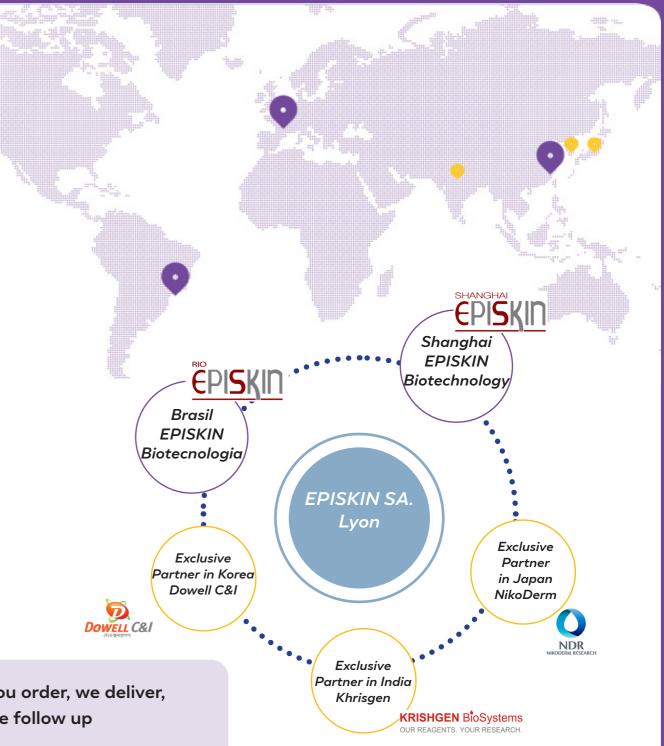
Quantitative expression of the Candida albicans secreted aspartyl proteinase gene family in human oral and vaginal candidiasis. Naglik JR et al. Microbiology, 154, 3266-3280.

Candida albicans-secreted aspartic proteinases (Sap) modify the epithelial cytokine response in an in vitro model of vaginal candidiasis. Schaller M, Korting HC, Borelli C, Hamm G, Hube B.

Infect Immun 73 (5): 2758-2765.

The secreted aspartyl proteinases sap1 and sap2 cause tissue damage in an in vitro model using vaginal candidiasis using reconstituted human vaginal epithelium. Schaller M, Bein M, Korting HC, Baur S, Hamm G, Monod M, Beinhauer S and Hube R

Infection and Immunology, 71, 6, 3227-3234.



### You order, we deliver, we follow up

Prior to your order our teams of experts are dedicated to help you in choosing the right model(s) and sharing the most accurate protocol(s). We take care of the logistics for an on time delivery by selecting the more efficient carrier and validating the route when necessary. Upon reception and further we are reachable real time for any question. ANYTIME, ANYWHERE

### Contact us

### www.episkin.com Episkin - 4, rue Alexander Fleming 69366 - LYON Cedex 7 - France +33 4 37 28 22 00

# **EPISKIN** ACADEMY

### We support our customers

We insure to users of 3D models the best support for implementing 3D's based standard protocols and assist them, for developing new applications of human reconstructed epithelium.

### We raise awareness

We relay and illustrate EPISKIN and group's commitments to 3R. Wetrainscientists, KOL, students and future stakeholders to the scientific and regulatory challenges of alternative to animal testing.

## Education

EPISKIN Academy created in 2011 is an international program dedicated to promotion and education to alternatives to animal testing methods in toxicology.

As a world leader in tissue engineering, we are committed to share our knowledge and expertise with scientific community to support implementation of in vitro validated methods and development of new methods using human reconstructed tissues. It is with this in mind that we offer training on validated in these fields. To go further, we are also engaged in several academic programs worldwide

regulators for the challenges of 21st century toxicology. Certified Program

WORLWIDE CERTIFICATION PROGRAMME with more than 200 scientists

## We promote scientific expertise

We promote scientific expertise and uses of 3D models by interacting and networking with We participate actively to congresses, workshops for sharing scientific results onto human 3D models and promote publication of new data generated by our worldwide



for your benefits