



Data Sheet

NeoFull-Thickness™ 3D Human Melanoma Skin Model

Product Catalog: NEP3D2-12

Format: 6, 12, 24-well plates

Storage Conditions: 37°C incubator with 5% CO₂

Product Description

The NeoFull-Thickness™ 3D Human Melanoma Skin Model is a fully stratified, organotypic in vitro model that accurately replicates the structural and functional complexity of human skin containing melanoma tumors. This advanced 3D model integrates human dermal fibroblasts, epidermal keratinocytes, and melanoma cells within a native-like extracellular matrix, providing a physiologically relevant platform for cancer research and preclinical drug development.

The model expresses all key 3D skin cancer markers and offers a reliable, human-relevant alternative to animal testing, aligning with global regulatory initiatives such as the FDA Modernization Act 2.0 and the EU Cosmetics Regulation.

Key Features & Benefits

Feature

Benefit

Full-thickness architecture

Replicates epidermal stratification, dermal matrix, and basement membrane organization

All 3D skin cancer marker expression

Comprehensive biomarker panel including S100B, Melan-A, GP100, Ki67, and cytokeratins

Multiple well formats (6, 12, 24)

Flexible throughput for screening and mechanistic studies



Feature	Benefit
Animal-free construction	Ethically superior, reduced inter-lot variability, and pathogen-free
Regulatory-aligned	Supports OECD TG 431/439 compliance and FDA modernization goals
Predictive drug response	Clinically relevant responses to targeted therapies (e.g., vemurafenib)

Model Architecture

The NeoFull-Thickness™ model comprises three integrated compartments:

1. **Epidermis:** Stratified layers of human keratinocytes (basal, spinous, granular, and cornified layers) expressing differentiation markers including:
 - Cytokeratin 10 (suprabasal)
 - Cytokeratin 14 (basal layer)
 - Involucrin
 - Filaggrin
2. **Dermis:** Human dermal fibroblasts embedded in a collagen type I matrix, providing structural support and paracrine signaling essential for basement membrane formation
3. **Melanoma Component:** Patient-relevant melanoma cells integrated either as:
 - Spheroids within the dermal matrix, or
 - Intermixed with keratinocytes in the epidermal compartment

This tripartite structure ensures faithful recapitulation of the tumor microenvironment (TME) and enables accurate study of tumor-stroma interactions.

Biomarker Validation

The NeoFull-Thickness™ model is validated for expression of all 3D skin cancer markers:

Marker	Expression Location	Significance
S100B	Melanoma cells	Melanoma-specific marker
Melan-A / MART-1	Melanoma cells	Melanocyte lineage marker
GP100 / HMB-45	Melanoma cells	Melanoma-associated antigen
Ki67	Proliferating cells	Proliferation index
Cytokeratin 10	Suprabasal epidermis	Epidermal differentiation
Cytokeratin 14	Basal epidermis	Basal layer integrity
Involucrin	Stratified epidermis	Terminal differentiation marker
IDO-1 / IL-6	Melanoma microenvironment	Immune response and metabolic reprogramming

Functional Performance

Drug Response Testing

The model demonstrates robust, quantifiable responses to standard-of-care therapies:

- **Vemurafenib (BRAF inhibitor):** Significant tumor volume reduction within 72 hours ($p=0.0011$)
- Real-time monitoring via fluorescence imaging enables kinetic assessment of drug efficacy

Barrier Function

- Forms a functional epidermal barrier with measurable transepithelial electrical resistance (TEER)



- Maintains integrity for extended culture periods under standard conditions

Tumor Microenvironment Modeling

- Recapitulates key TME features including:
 - Fibroblast-keratinocyte crosstalk
 - Basement membrane organization
 - Tumor progression and metastasis-related gene expression

Specifications

Parameter	Specification
Format	6, 12, and 24-well plates
Cell Types	Primary human keratinocytes, fibroblasts, and melanoma cells
Matrix	Type I collagen (human origin)
Culture Duration	14-21 days (air-liquid interface)
Incubation Conditions	37°C, 5% CO ₂ , humidified atmosphere
Media	Serum-free, chemically-defined (animal origin-free available upon request)
Shelf Life	5 days (prepared models); extended with media renewal



Quality Control

Each production lot undergoes rigorous quality testing:

- **Histological assessment:** H&E staining confirming stratification and tissue architecture
- **Immunofluorescence:** Validation of all key biomarker expression
- **Barrier integrity:** TEER measurement ensuring functional competence
- **Sterility testing:** Negative for mycoplasma, bacteria, and fungi

Regulatory & Ethical Alignment

The NeoFull-Thickness™ model is developed in accordance with:

- **FDA Modernization Act 2.0:** Supporting non-animal approaches for preclinical testing
- **OECD Test Guidelines 431 & 439:** Compliant with reconstructed human epidermis standards
- **EU Cosmetics Regulation:** Animal-testing ban compliant
- **3Rs Principles:** Replacement, Reduction, and Refinement of animal use in research

Applications

Application Area	Use Case
Oncology Research	Melanoma progression, metastasis, and drug resistance studies
Drug Screening	High-throughput efficacy and toxicity testing
Immuno-oncology	Immune cell infiltration and checkpoint inhibitor evaluation



Application Area

Use Case

Personalized Medicine

Patient-derived tumor models for tailored therapy selection

Mechanistic Studies

Tumor-stroma signaling, biomarker discovery, and metabolic profiling

Ordering Information

Product

Catalog

Format

NeoFull-Thickness™ 3D Melanoma Model

NEP3D2-6

6-well plate

NeoFull-Thickness™ 3D Melanoma Model

NEP3D2-12

12-well plate

NeoFull-Thickness™ 3D Melanoma Model

NEP3D2-24

24-well plate

Customization Services Available:

- Patient-derived melanoma cell integration
- Immune cell co-culture (T cells, macrophages)
- Custom biomarker validation panels

Storage & Handling

- **Storage:** Maintain plates at 37°C in a humidified 5% CO₂ incubator
- **Media Replacement:** Replace maintenance media every 48-72 hours
- **Shipping:** Models shipped in specialized transport media at ambient temperature (receive and process within 24-48 hours)



References

1. Full-thickness skin reconstruct models demonstrating epidermal stratification and dermal integration
2. Characterization of 3D melanoma models with biomarker validation and drug response data
3. Chemically-defined, animal origin-free culture systems for 3D skin models
4. Regulatory frameworks supporting MPS adoption (FDA Modernization Act, OECD guidelines)
5. Immunofluorescent validation of melanoma markers in full-thickness models
6. Biomarker detection (IDO-1, IL-6) in 3D melanoma models
7. Reproducibility and gene expression characterization of full-thickness models
8. 3D bioprinted skin expressing cytokeratin 14 and involucrin

For technical support or custom orders, please contact our Scientific Support Team.

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