BIOMIMESYS® by HCS Pharma

# Biofunctionalized hydroscaffold for 3D culture

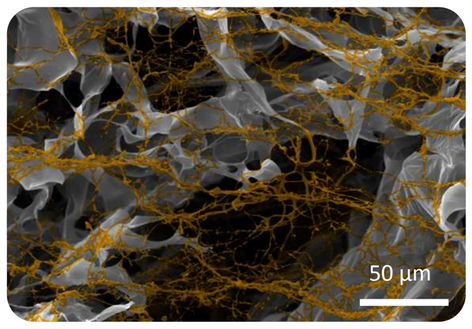
## BIOMIMESYS®*Adipose tissue*, a relevant *in vitro* adipocyte 3D model

### BIOMIMESYS®*Adipose tissue* is physiological

BIOMIMESYS® range are hyaluronan based hydroscaffolds developed to overcome the 2D flat culture limitations by recreating an *in vivo* physiology within the *in vitro* environment.
BIOMIMESYS®*Adipose tissue* hydroscaffold is made of RGDS-grafted Hyaluronic acid (1.6 MDa), Adipic acid dihydrazide crosslinker and extracellular matrix (ECM) proteins (collagen type I and collagen type VI) to mimic fat tissue-ECM composition.

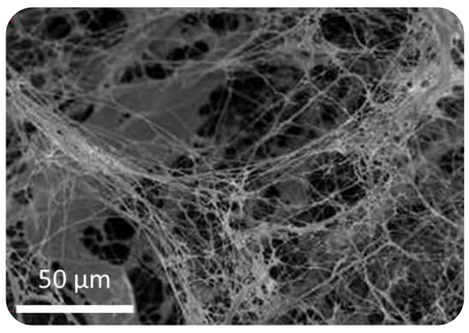
PHYSICOCHEMICAL FEATURES
Porosity: 70-170 µm
Young's modulus: E = 0.45 ± 0.05kPa
Swelling ratio = 60 ± 10g/g

Biomimetic structure




SEM observation of a BIOMIMESYS®*Adipose tissue* section, highlighting the collagen chain, (artificially coloured)

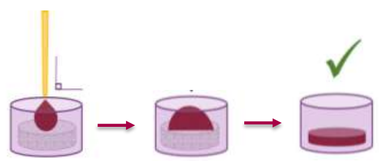
In comparison to *in vivo* decellularized adipose tissue




SEM observation of a human decellularized adipose tissue (from Wang *et al.,* 2013 (1) )

### BIOMIMESYS®*Adipose tissue* is ready to use

Available in a ready-to-use format (96 well plates) it enables the culture of adipocytes under physiological conditions that are representative of the microenvironment found in adipose tissue(2).
Adipocytes cells are simply seeded on top of the hydroscaffold and placed in the incubator.
The media can be refreshed easily by pipetting.



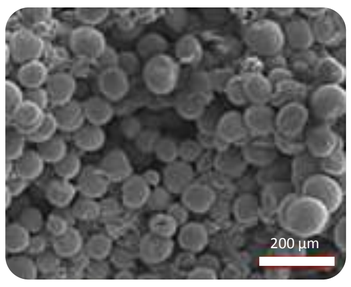
### BIOMIMESYS®*Adipose tissue* is compatible with all analytical technologies

Being transparent makes it suitable for microscopy (immunofluorescence, brightfield) and use in plate readers (OD, fluorescence).
Thanks to its porosity, proteins and nucleic acid can be extracted by directly adding the lysis buffer to the hydrogel.

## Morphology

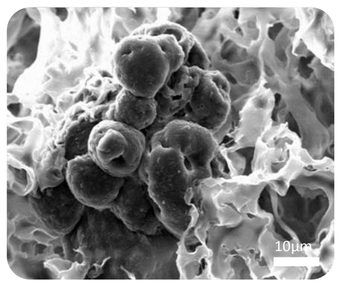
*In vivo*

Human adipocytes clusters from abdomen liposuction
(from Kurita *et al.,* 2008 (3) )

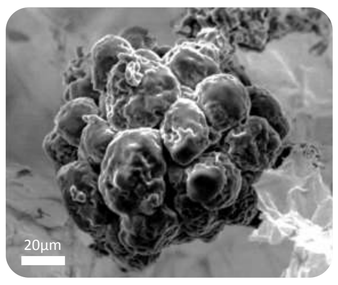



In BIOMIMESYS®*Adipose tissue*

Murine Preadipocytes **3T3-L1** at day 7



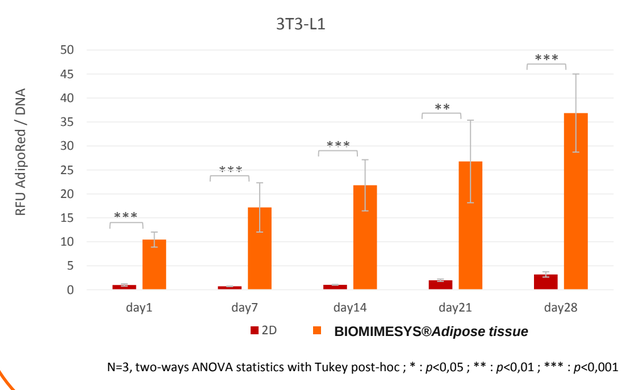

Human White Preadipocytes (**HWP**) at day 14




*In vivo*-like organisation of adipose tissue in BIOMIMESYS®*Adipose tissue.*

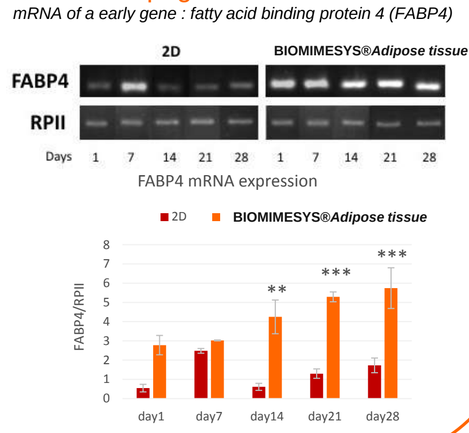
## Adipocyte differentiation

Lipids accumulation – **3T3-L1**
*AdipoRed™ Assay Reagent*




N=3, two-ways ANOVA statistics with Tukey post-hoc ; * : $p<0,05$ ; ** : $p<0,01$ ; *** : $p<0,001$

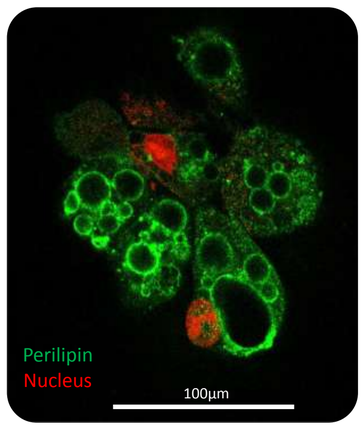
Adipogenesis - **HWP**
*mRNA of a early gene : fatty acid binding protein 4 (FABP4)*




Better lipogenic activity and higher differentiation rate in BIOMIMESYS®*Adipose tissue* compared to 2D culture.

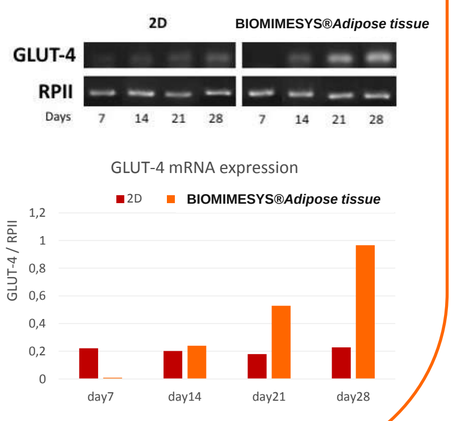
## Adipocyte maturation

Perilipin immunostaining – **HWP**
*a maturation marker : the lipid droplet-associated protein*




LSCM observation of Z-stack at day 21.

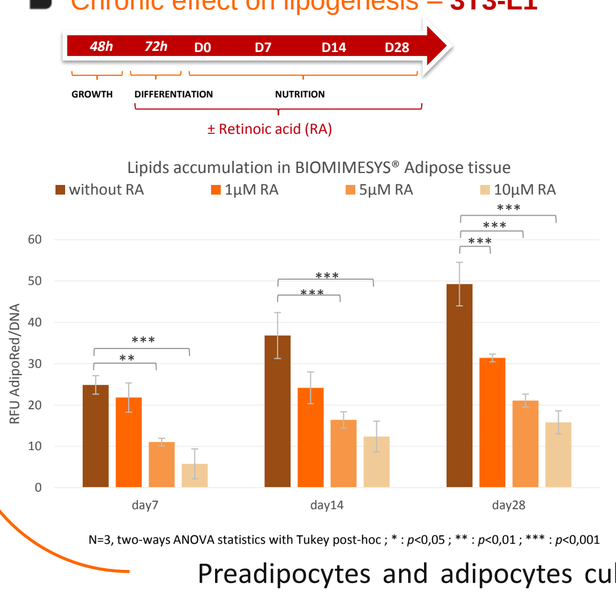
Adipogenesis - **HWP**
*mRNA of a late gene : glucose transporter type 4 (GLUT-4)*




HWP undergo complete maturation using BIOMIMESYS®*Adipose tissue*.

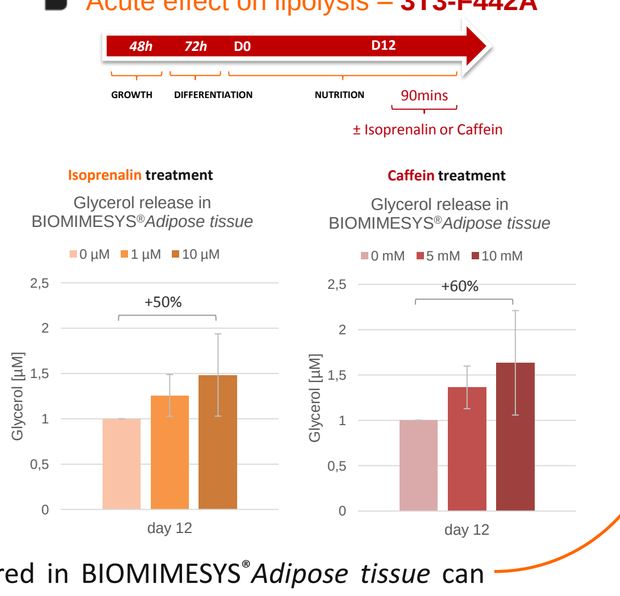
## Drug screening

Chronic effect on lipogenesis – **3T3-L1**




N=3, two-ways ANOVA statistics with Tukey post-hoc ; * : $p<0,05$ ; ** : $p<0,01$ ; *** : $p<0,001$

Acute effect on lipolysis – **3T3-F442A**




Preadipocytes and adipocytes cultured in BIOMIMESYS®*Adipose tissue* can be used as models for lipogenesis and lipolysis analysis.

BIOMIMESYS®*Adipose tissue* has been tested on 3T3-L1, 3T3-F44 cells and on human cryopreserved preadipocytes (HWP). It makes 3D cell culture easy and provides a robust *in vitro* and reliable model for metabolism studies such as obesity or diabetes and drug discovery.

**To know more about BIOMIMESYS®*Adipose tissue* visit our website: www.biomimesys.com**

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**References:**

(1) L. Wang et al. Combining decellularized human adipose tissue extracellular matrix and adipose-derived stem cells for adipose tissue engineering, Acta Biomaterialia 2013 (9):8921-8931.

(2) G. J. Hausman. Meat Science and Muscle Biology Symposium: The influence of extracellular matrix on intramuscular and extramuscular adipogenesis, Journal of Animal Science 2012 (90):942-949.

(3) M. Kurita et al. Influences of Centrifugation on Cells and Tissues in Liposuction Aspirates: Optimized Centrifugation for Lipotransfer and Cell Isolation, Plastic and Reconstructive Surgery 2008 121(3):1033-1041.