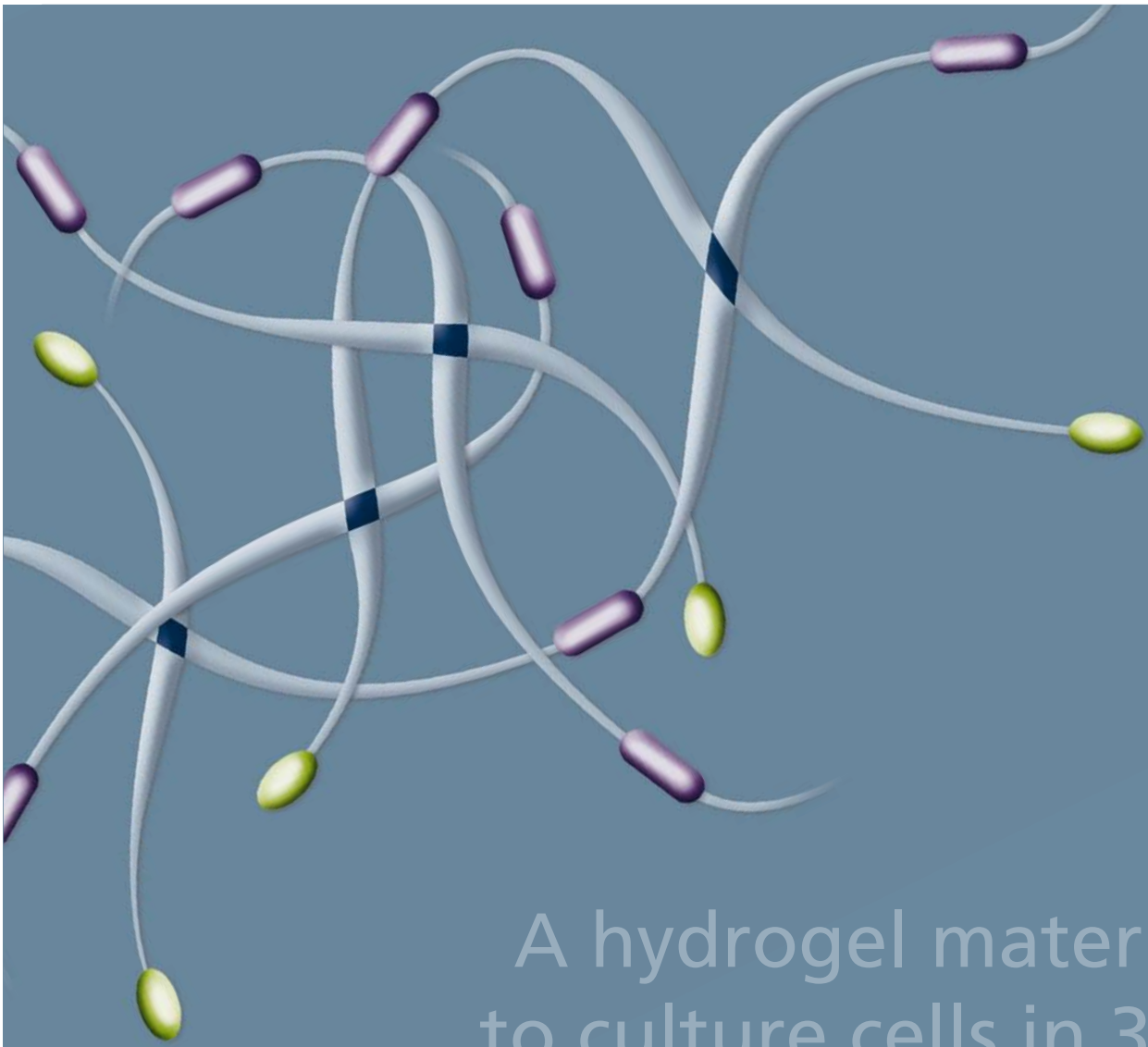
the 3D matrix for life science

QGel™ MT 3D Matrix
Product information

QGel



A hydrogel material to culture cells in 3D.

A fully synthetic matrix with controllable properties.

QGel™ is for research in stem cells, cancer, and regenerative medicine.

Why is **QGel™** a **state-of-the-art** material?

QGEL™ MT 3D MATRIX

BIOLOGICALLY AND CHEMICALLY TAILORED

QGel™ MT 3D Matrix is a synthetic ECM that does not present disadvantages often associated with other synthetic materials: **QGel™ matrix can be engineered with biological and biochemical entities such as adhesion ligands, protease sensitive sites and/or soluble growth factors** in order to include capabilities of native tissues.

CELL-MEDIATED DEGRADATION

Contrary to typical synthetic matrices, **QGel™ degradation is exclusively mediated by the cells themselves via protease secretion and activation** according to how they migrate. There is no bulk hydrolysis process taking place.

EASY HANDLING

QGel™ is **easy to handle: just add QGel™ Buffer and your cell solution to the QGel™ MT 3D Matrix powder.** The hydrogel forms within 5-10 minutes under physiological conditions. No temperature precautions are required and cells are not exposed to unphysiological pH during the encapsulation process.

HIGH REPRODUCIBILITY

QGel™ guarantees **high gel property reproducibility between batches and vials** and QGel™ MT 3D matrix is manufactured following strict pharmaceutical standards.

HIGH LEVEL OF EVIDENCE

QGel™ technology is **based on over 10 years of research** that have demonstrated its efficacy in 3D cell culture and tissue engineering. QGel™ MT 3D matrix chemistry and several applications are **published in among the best biotechnology journals**.

QGel™ MT 3D Matrix composition

From a biologically inert polymer, QGel™ MT* 3D matrix can be engineered with biological and biochemical characteristics by modularly varying its components such as protease sensitive sites, adhesion ligands and/or other bioactive elements.

STRUCTURAL COMPONENT
Fully synthetic and biologically inert polymer (PEG)

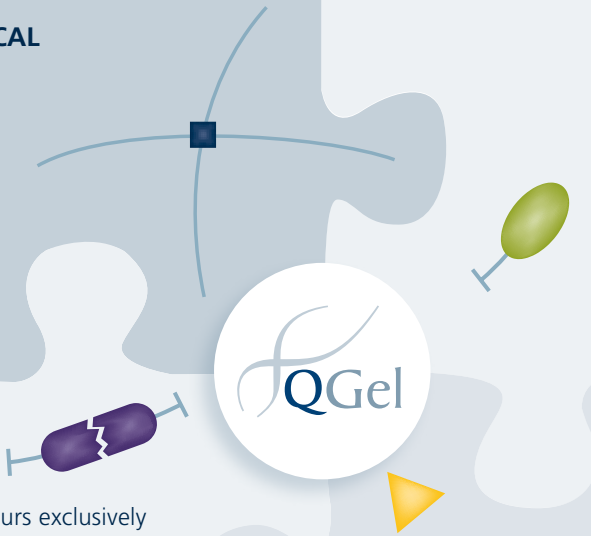
CELL ADHESION-PROMOTING COMPONENT
Covalently-bond RGD peptide

FULLY SYNTHETIC MATERIAL:
- no risk of animal transcontamination
- reduced experimental error
- highly reproducible

VARIABLE MECHANICAL PROPERTIES:
- gel stiffness can be engineered by modifying polymer architecture and concentration

RGD PEPTIDE INCORPORATION:
- through cell-integrin binding, RGD stimulates cells and allows them to adhere to the matrix
- RGD concentration is set to an optimum between cell attachment and migration

VARIABLE ADHESION PROPERTIES:
- QGel™ matrix is available with and without RGD



CELL-MEDIATED DEGRADATION:
- matrix degradation occurs exclusively via cell secreted and activated proteases (MMPs)
- a natural matrix-remodelling process (no passive hydrolysis degradation)

VARIABLE DEGRADATION SENSITIVITY:
- degradation sensitivity can be engineered by modifying the amino acid sequence of the degradation component (e.g. MMP-sensitive vs MMP-insensitive gels)

FOR EXAMPLE:
- rhBMP-2 was physically entrapped in QGel™ matrix and released upon cell-mediated degradation to sustain repair of bone defects
- genetically engineered VEGF was covalently incorporated in QGel™ matrix and allowed growth of vascularized tissue
- incorporation of tethered specific peptides guided embryonic stem cells behavior

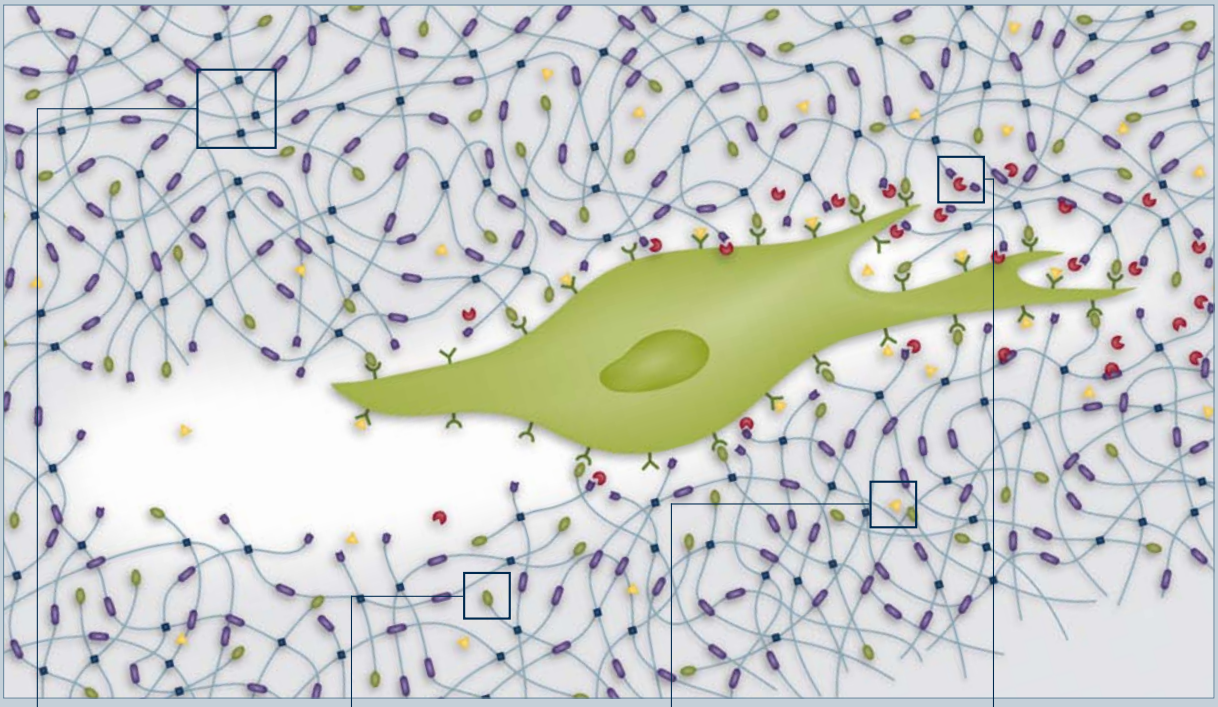
For more information please see p.10

DEGRADATION COMPONENT
Enzymatically degradable matrix crosslinker

BIOACTIVE COMPONENT
Possibility of incorporation and release of biomolecules and morphogens

* Structural components react with degradation and adhesion components via Michael-Type (MT) conjugate addition reaction. MT reaction occurs at room temperature under physiological pH. The hydrogel starts forming within 5-10 minutes but requires 30-45 minutes to allow complete crosslinking reaction at 37°C (cell incubator).

Closer look at the **QGel™ MT 3D matrix**



The structural component (PEG) gives a mechanical support to the cells.

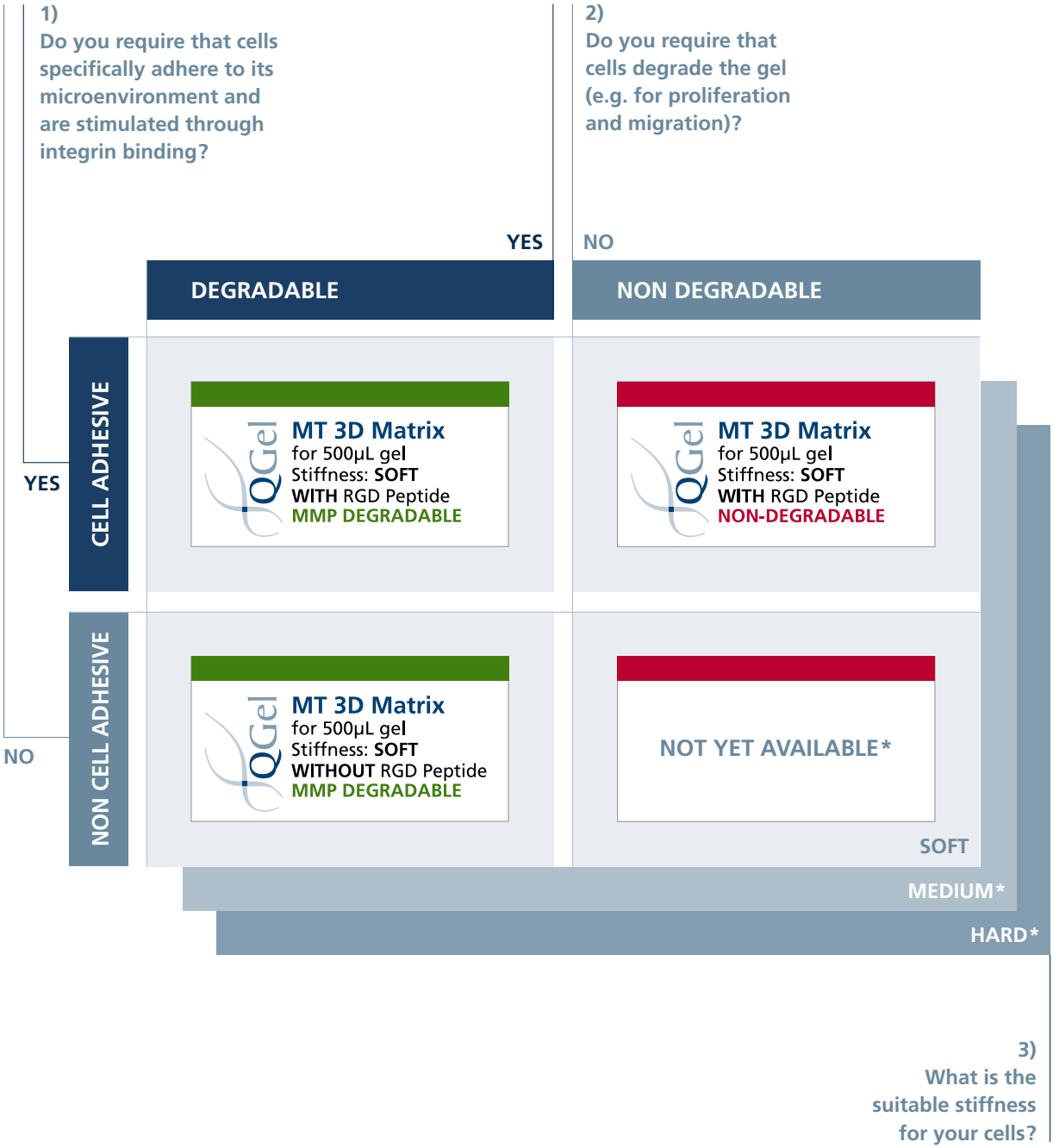
Cells specifically bind to the adhesion component (RGD), resulting in cell stimulation through integrin-binding.

Growth factor at desired concentration can be incorporated during gelation and/or diffuse from culture media within the gel.

Cell-secreted proteases (MMPs) cleave the degradation component allowing cells to move further and proliferate.

QGel™ MT 3D matrix is suitable for many cell types. Adhesion properties, degradability and stiffness can be controlled by choosing the QGel™ product that suits your experiment. (more information on page 06)

QGel™ adapts to most cell types



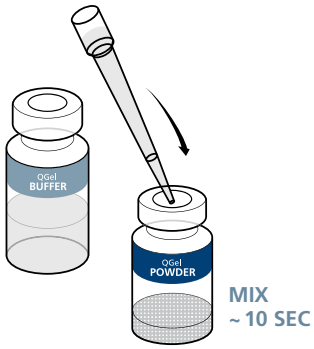
* In May 2010, soft QGel™ MT 3D Matrix is available to order.
Shear modulus of the soft QGel matrices is in the range of 800-1000 Pa.
Medium and hard gels will be available soon. Please check QGel's website **www.qgelbio.com** for current product availability.


Choose the QGel™ product
that suits your experiment.

How to cast gels with QGel™?

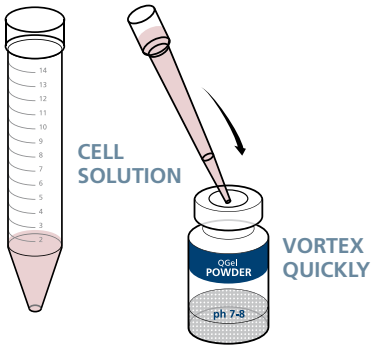
QGEL™ MT 3D MATRIX is a ready-to-use lyophilized powder containing pre-mixed components.
Below shows how we recommend to make gel discs from the QGel™ MT 3D Matrix powder.

1



Resuspend QGel™ MT 3D Matrix powder by addition of 400 µL of the QGel™ Buffer A and vortex about 10 seconds

2



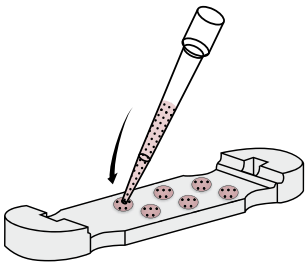
Add 100 µL of the cell suspension and vortex quickly for homogenization

3

After mixing, pipette the solution out and...

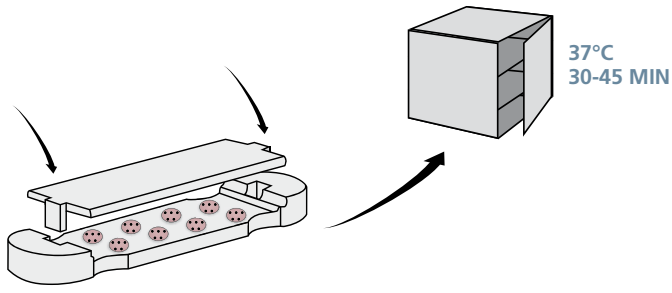
QGel™ makes available QGel™ Buffer A which will give you 5-10 minutes* to work with the solution before it gels. Indeed, the reaction kinetics is pH-dependent: the higher the pH, the faster gelation occurs.

4



... quickly apply drops on the QGel™ 3D Disc Caster (or similar)

5



close the disc caster carefully and incubate the structure in a cell culture incubator (37°C) for 30-45 minutes.

* Depending on the experimental conditions.

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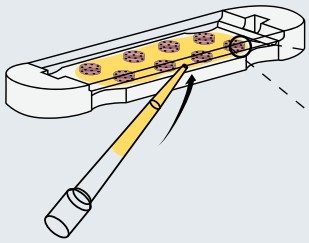

Apply PBS (Phosphate-Buffered Saline) around the gel discs and then open slowly the QGel™ 3D Disc Caster.

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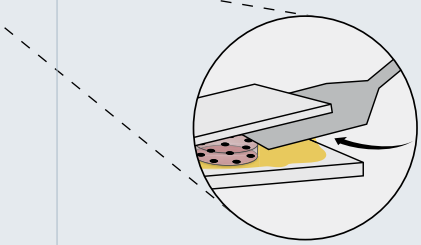
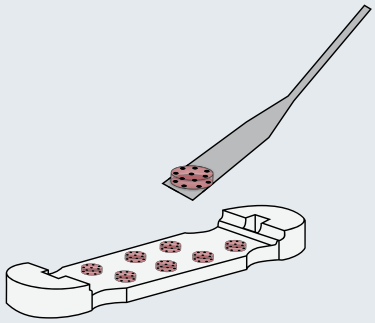


To avoid gel sticking to the caster surfaces, first detach slightly the disc edges with a spatula to allow PBS to flow through upper and lower interfaces.

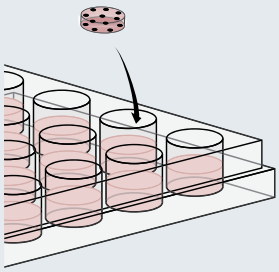
8



Once the disc caster is opened, use the spatula to gently pick up each disc.

The QGel™ 3D Disc Caster is a casting device specifically designed to make QGel discs. This two-piece product helps you to make gel discs consistently and reproducibly.

9



Each gel disc is transferred into a 24-well-plate containing 1 ml pre-warmed culture medium. Medium is subsequently replaced after two hours incubation and then according to your experimental conditions.

10

Samples are now ready for long-term culture.

TIPS 'N TRICKS

The gel hardens in 5-10 minutes once QGel™ MT 3D Matrix powder is mixed with QGel™ Buffer A. You will notice a "little filament" sticking to the pipette tip at the point of gelation. After this point, it is no longer possible to pipette the gel solution.

After casting your gel discs, you may have some leftover gel in the glass vial; use this to monitor when the "little filament" forms.

Further experiments and analysis

Light microscope image of human foreskin fibroblasts cultured in 3D within QGel™ MT 3D Matrix (catalog number 1001) for 3 weeks.

MICROSCOPIC OBSERVATION OF THE CELLS

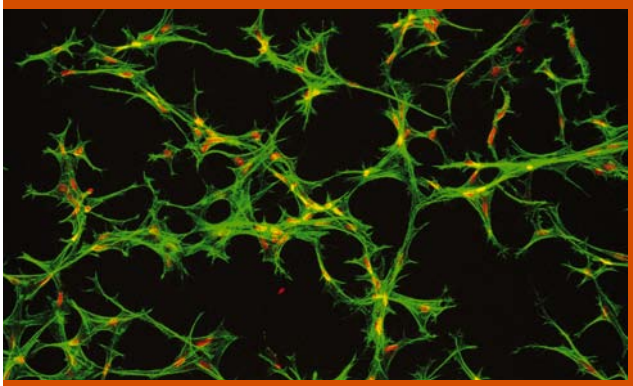
QGel™ MT 3D Matrix is fully transparent and encapsulated cells can be observed clearly after weeks, even months, of culture. Both conventional light micro-scope and confocal laser microscope (fluorescence staining) can be used.

CELL VIABILITY AND PROLIFERATION ASSAYS

Traditional assays, such as live/dead stainings and other qualitative/quantitative tests that involve spectroscopic measurements, can be used to assess cell viability and proliferation in QGel™ matrix.

IMMUNOCYTOCHEMISTRY AND HISTOCHEMISTRY

QGel™ matrix allows for conventional immunofluorescence labelling of cells in gels and high-quality imaging using confocal laser microscopy.
Histology can also be performed on QGel™ matrix. Frozen section methods of gels are preferable.



Confocal image of human foreskin fibroblasts cultured in 3D within QGel™ MT 3D Matrix (catalog number 1001) for 3 weeks.

CELL RECOVERY VIA QGEL™ MATRIX DISSOLUTION

For sub-culture, cells can be recovered from QGel™ MT 3D Matrix by proteolytic digestion of the gels with trypsin. For DNA and RNA extraction, other proteases (e.g. proteinase K or collagenase*) can also be used to digest QGel™ matrix.

CELL TRANSPLANTATION IN VIVO

QGel™ matrix carrying cells can be transplanted to animal tissues to induce and study specific in vivo responses.

INCORPORATION OF BIOACTIVE MOLECULES

Bioactive molecules can be incorporated into QGel™ MT 3D Matrix during gelation. However, the strategy of incorporation and delivery strongly depends on the nature of the molecule and requires further investigation by the users. Examples of incorporation of peptides, BMP and VEGF can be found in already published works**.

For more information or if you have any additional questions, please refer to the comprehensive FAQ on:
www.qgelbio.com/support

* Kraehenbuehl T et al., Three-dimensional extracellular matrix-directed cardioprogenitor differentiation: Systematic modulation of a synthetic cell-responsive PEG- hydrogel, *Biomaterials*, 2008.

** Lutolf M et al., Repair of bone defects using synthetic mimetics of collagenous extracellular matrices, *Nature Biotechnology*, 2003.
Zisch A et al., Cell demanded release of VEGF from synthetic, biointeractive cell-ingrowth matrices for vascularized tissue growth, *The FASEB Journal*, 2003.
Lee S et al., Engineering integrin signaling for promoting embryonic stem cell self-renewal in a precisely defined niche, *Biomaterials*, 2009.

Product portfolio
and ordering information

Please find below the list of QGel products.
QGel™ MT 3D matrix is delivered in vials as a lyophilized powder: one vial allows you to cast up to 500 µl gel. QGel™ Buffer is recommended. Please make sure you include QGel™ Buffer with your order.

www.qgelbio.com/shop

ITEM DESCRIPTION	STIFFNESS	DEGRADABLE	ADHESION PROPERTIES	CATALOG NUMBER
QGel™ MT 3D Matrix for 500 µl gel	Soft	Yes	with RGD	1001
QGel™ MT 3D Matrix for 500 µl gel	Soft	Yes	none	1004
QGel™ MT 3D Matrix for 500 µl gel	Soft	No	with RGD	1007
QGel™ MT 3D Matrix for 500 µl gel	Soft	No	none	*
QGel™ MT 3D Matrix for 500 µl gel	Hard	Yes	with RGD	*
QGel™ MT 3D Matrix for 500 µl gel	Hard	Yes	none	*
QGel™ MT 3D Matrix for 500 µl gel	Hard	No	with RGD	*
QGel™ MT 3D Matrix for 500 µl gel	Hard	No	none	*
QGel™ Buffer A (4ml)				2001
QGel 3D Disc Caster				4001

* Part of the QGel products are currently under development and will be available soon. Please check QGel website www.qgelbio.com for current product availability.

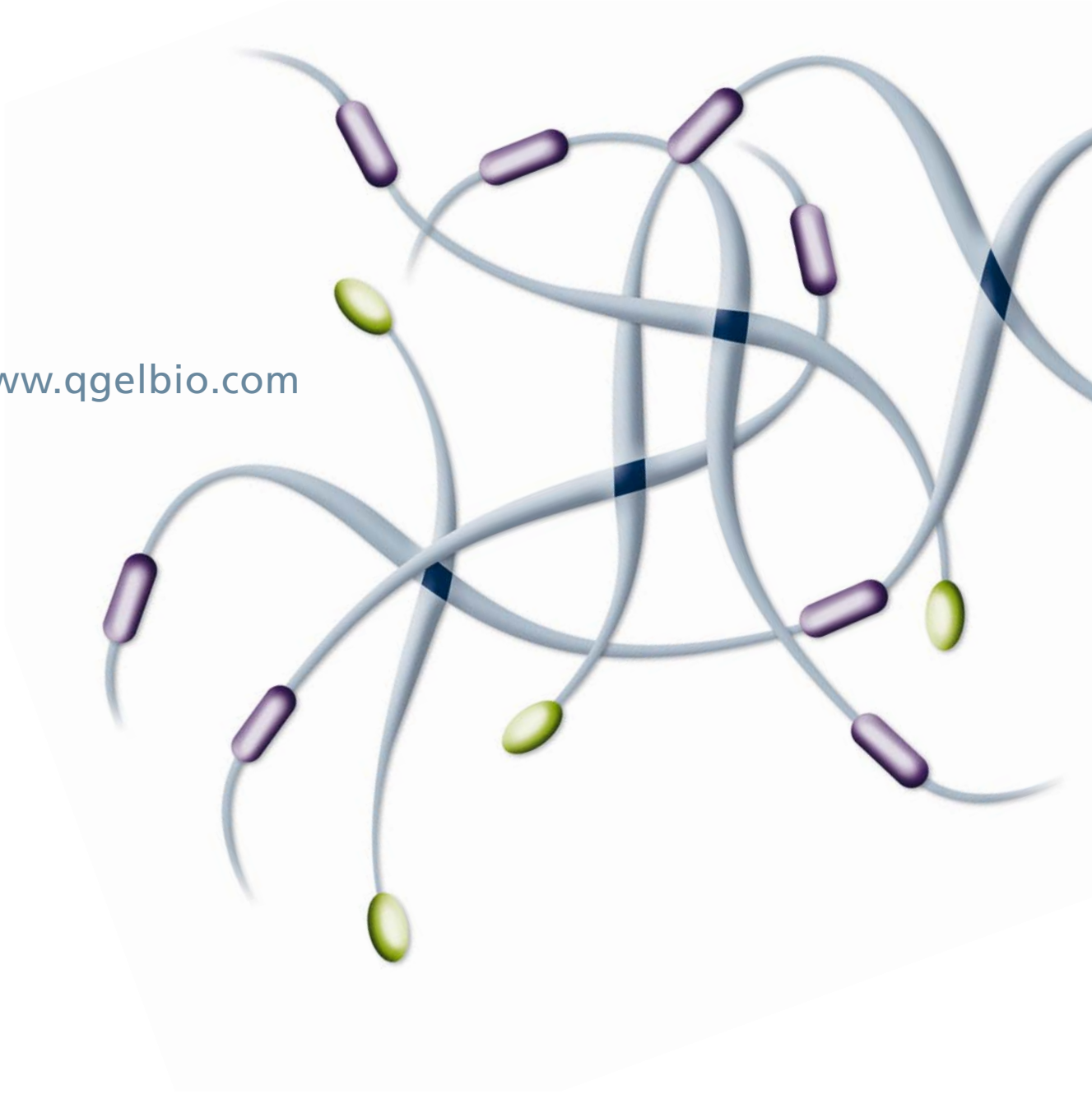
All QGel™ products are manufactured according to strict pharmaceutical standards. Each vial is sealed in a sterile nitrogen gas environment.

More detailed information about products and availability on: **www.qgelbio.com**

Contact: info@qgelbio.com

NOT FOR HUMAN USE. FOR RESEARCH USE ONLY.

www.qgelbio.com



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P03v00 / April 2010