

Biomaterial Analytics

❖ Mechanical Testing Procedures for Biomaterials and Packages

Tensile and Bending Characteristics

- Tensile, pressure and bending tests
- Resistance and resilience
- Peel tests for packaging materials
- Tear resistance
- Micro und Shore hardness of polymers



Rheological Characterization

- Viscoelastic properties
- Yield point, viscosity
- Lifetime tests (T-Sweep)
- Polymerization and cross-linking reactions
- Denaturation temperature



❖ Physico-chemical Analyses of Biomaterials

Thermoanalytic Methods (DSC)

- Micro porosity (ceramics)
- Denaturation of collagen
- Degree of cross-linking of biopolymers



In-vitro Stability Assessment

- Hydrolytic and enzymatic degradation

Storage and Decomposition

- Storage tests according to FDA, Aging (real time test/ accelerated test)
- Tightness and permeation of tubes for biobanking applications and packages

Histology

❖ Histology of Sensible Biomaterials

Draining, Infiltration, Embedding

- Adaption of each process step to individual requirements
- Cold embedding (synthetic resin)
- Paraffin embedding
- Cryogenic procedures
- Special procedures for dry and hydrophobic specimens



Cutting techniques

- Cryosectioning (dimensionally stable processing of soft materials)
- Paraffin sectioning
- Heavy duty sectioning



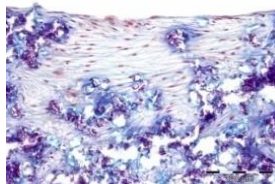
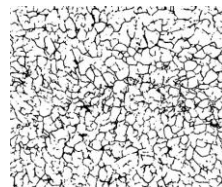
Histological staining

- Material specific
- Adapted to the cell density
- Differential staining
- Fluorescent staining
- Immunohistochemical staining

Microscopic evaluation

- Fitting imaging techniques (BF/ DF/ fluorescence)
- Picture analysis and evaluation: structural analyses and biological evaluation

Collagen matrix: Phase analysis



Histological specimen: tissue construct with osteoblasts

Cell Culture/ In-vitro Testing

❖ Cell Culture and Bioanalytics

3-dimensional Cell Culture and Co-Culture

- Human primary cells: Fibroblasts, chondrocytes, osteoblasts, keratinocytes and endothelial cells
- Osteogenic stimulated cell culture
- Dermal co-culture systems

Tissue Engineering

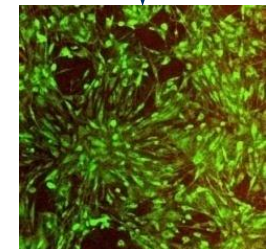
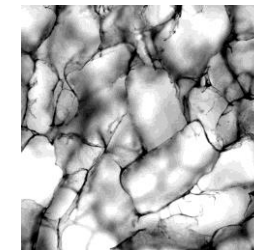
- Skin and mucosa engineering
- Bone engineering

Biochemical Analyses

- Testing for viability and cytotoxicity
- Pyrogenicity testing
- Proliferation (quality & quantity)
- Cell differentiation
- Biochemical synthesis activity

Morphological evaluation

- Light/ fluorescence microscopy
- Immunostaining



Osteogenic stimulated cell culture on a composite of hydrolyzed collagen and β -TCP

**Work and research areas
of the**

**Center of Cryo-Competence
in Life Sciences**

- ❖ *Development of tailor-made biomaterials for medicine, cell culture and tissue engineering*
- ❖ *Mechanical, chemical, structural, thermo-physical and biological analysis on biomaterials*
- ❖ *Histology of biomaterial and industrial goods, damage analysis, preparation of difficult materials*
- ❖ *Evaluation and qualification of biomaterials for the use in cell culture, regenerative medicine and tissue engineering*
- ❖ *Tissue engineering of skin, mucosa and bone constructs*
- ❖ *Development of cell-based in-vitro assays for the replacement of animal tests*
- ❖ *Studies on the cryopreservability of cells, tissue and artificial tissue constructs*
- ❖ *Equipment for cryomedicine and cryosurgery for veterinary and human use*
- ❖ *Development of cryo-protocols and equipment for the axenic cryopreservation and storage of cells and tissue*
- ❖ *Yield optimization in pharmaceutical freezing and enzyme freezing for intermediate & final process states*
- ❖ *Studies on tightness of tubes for biobanking applications, i.a. transport safety according to IATA and leak test after LN₂-contact*

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***Biomaterial Development and
Pharmaceutical Freezing***

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***Mechanical, physico-chemical,
morphological and biological
evaluation of biomaterials and
pharmaceuticals***