



Titre de la Session

Profession: Bio-Entrepreneur 2005

Mrs. F.M.Salzgeber(*) et R.A.Binot(#)

Fonction: *Resp. Dév. Commercial / #Coord. Sci. Biotechnologie

Société: Agence Spatiale Européenne

THE INTERNATIONAL SPACE STATION

European Space Agency

Frank M. Salzgeber

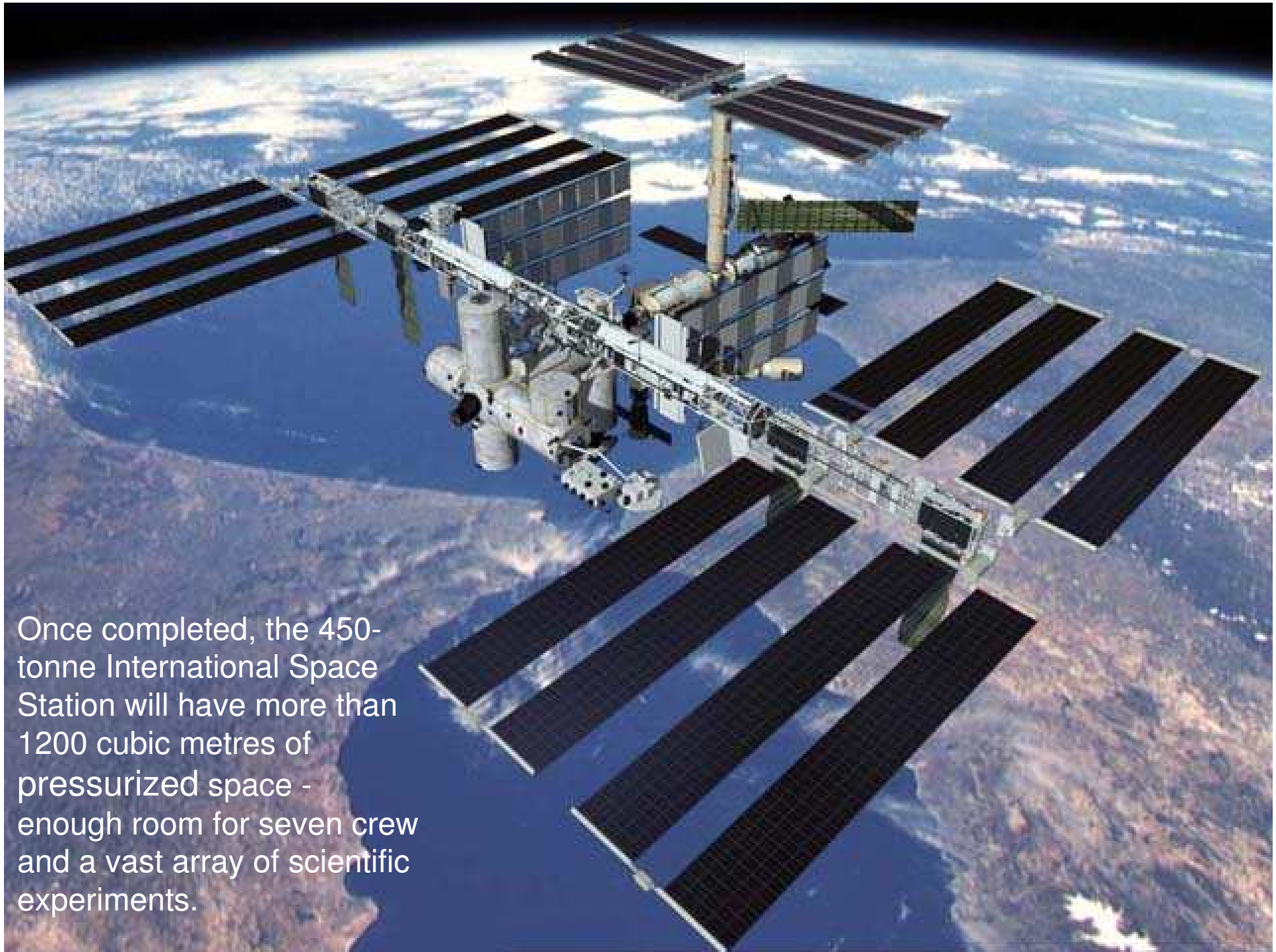
Head of Commercial Development

Directorate of Human Spaceflight Microgravity and Exploration



YOUR PARTNER FOR

THE INTERNATIONAL SPACE STATION



Once completed, the 450-tonne International Space Station will have more than 1200 cubic metres of pressurized space - enough room for seven crew and a vast array of scientific experiments.

Our offer:

Get rid of the “g”



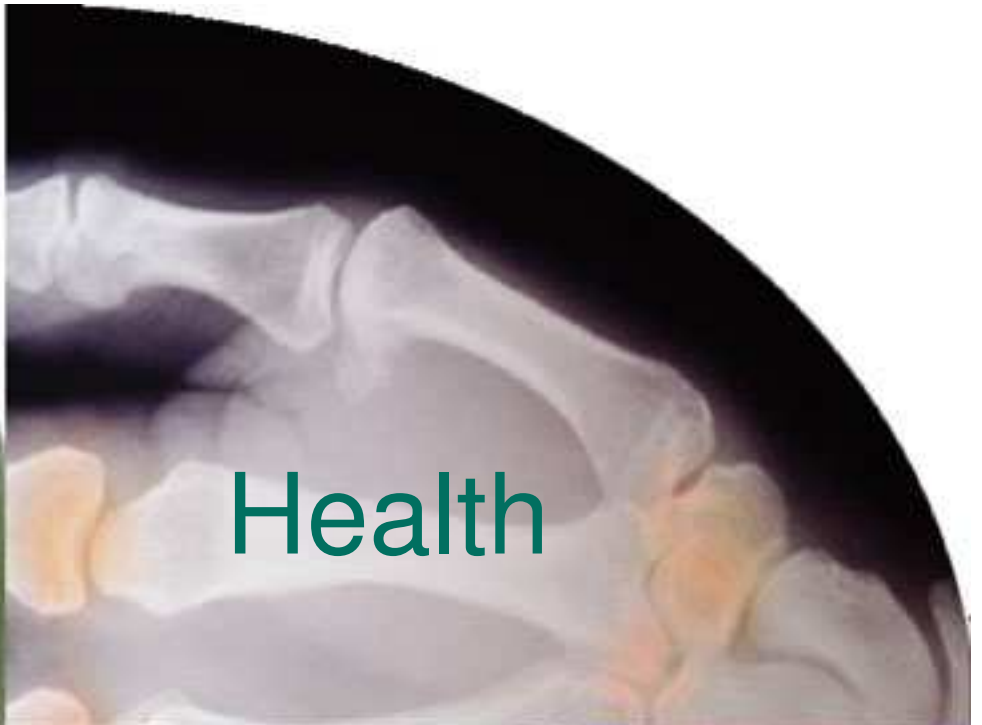


Biotechnology

applied research and
development



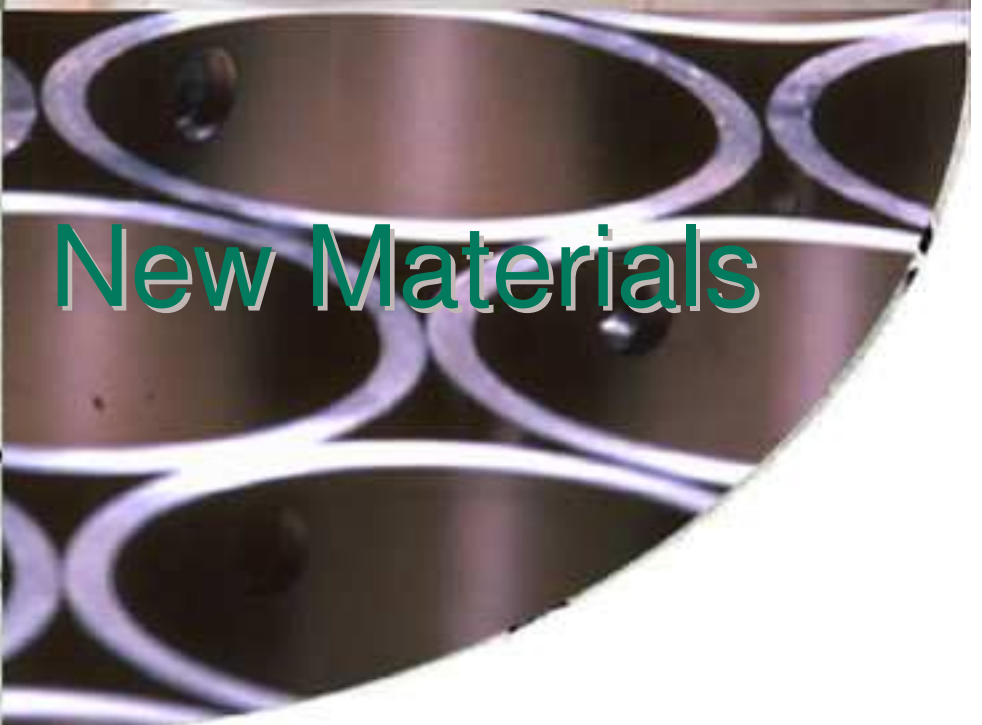
Food



Health



Environment



New Materials

Food



Access



Members in the Commercial Agent Network:



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THE INTERNATIONAL SPACE STATION



Marketing & Promotion

go **beyond** global

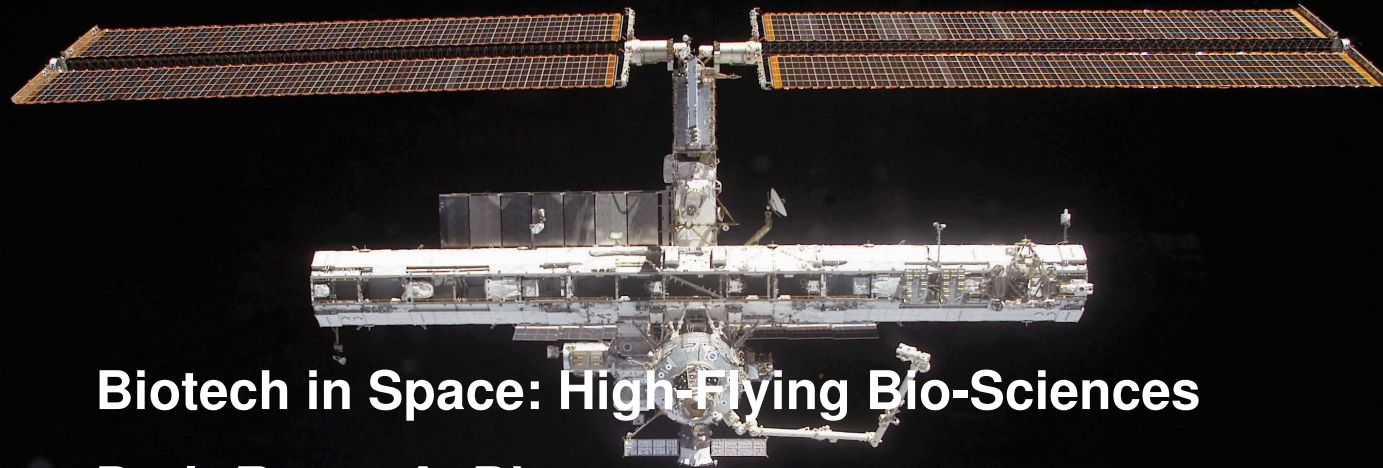
frank.salzgeber@esa.int





ESA Biotechnology Programme

Binot/ ESA Biotech. Progr. Coord.



Biotech in Space: High-Flying Bio-Sciences

Dr. Ir Roger A. Binot

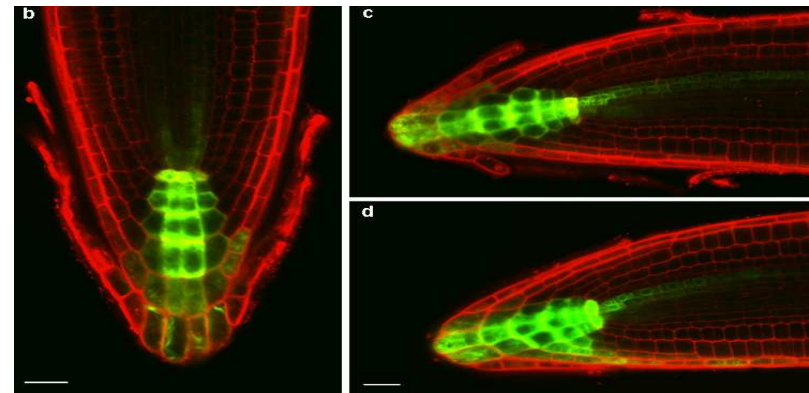
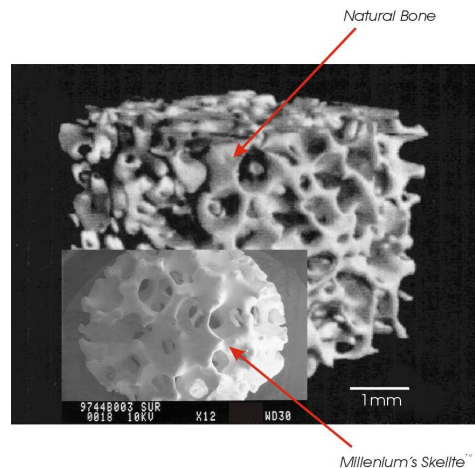
Coordinator Biotechnology Programme

ESA/HME/GA +31 71 565 48 15

ESA Biotechnology Programme

Binot/ ESA Biotech. Progr. Coord.

- Inspired from the ESF:
Integrated use of natural sciences and engineering sciences for all practical applications of biosystems to controlled in vitro, in vivo, and ex vivo operations, to industrial processes, and to the management of the environment



An example of a Biotechnology Project in Bio-Medicine

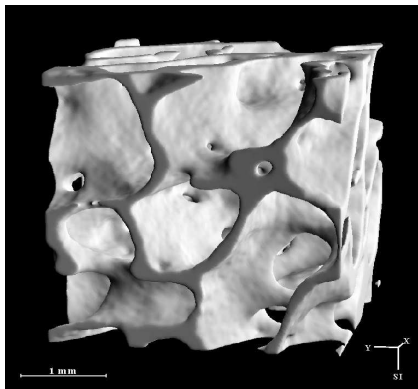
ERISTO "European Research in Space and Terrestrial Osteoporosis"

Binot/ ESA Biotech. Progr. Coord.

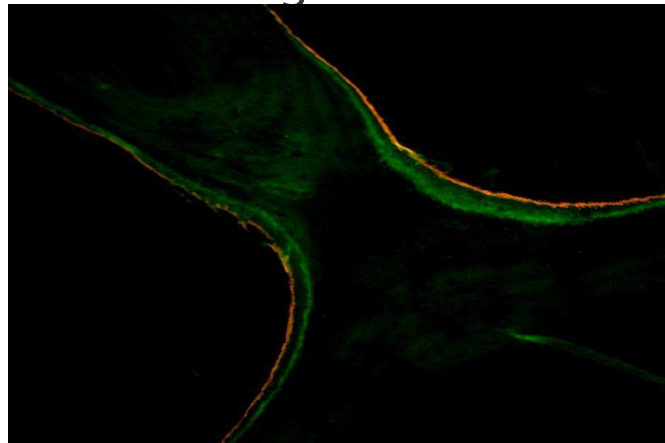
ERISTO focuses on the **mechanical* link** between genetics and -cell, -multi-cellular systems, and -physiological behaviour

(* covers here all mechanical aspects including fluid convection and g related transport in general)

ERISTO takes advantage of the observed **faster bone evolution in space** and develops *in vitro*, *in vivo*, *ex vivo*, and animal models to support bone and drugs research



15 et 16 Mars 2005



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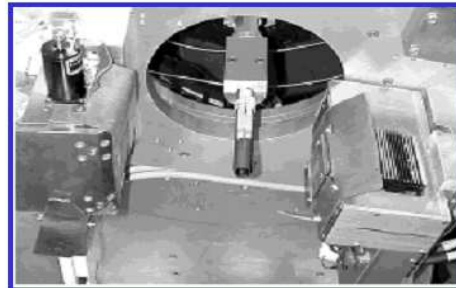


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any real industrial application? Binot/ ESA Biotech.

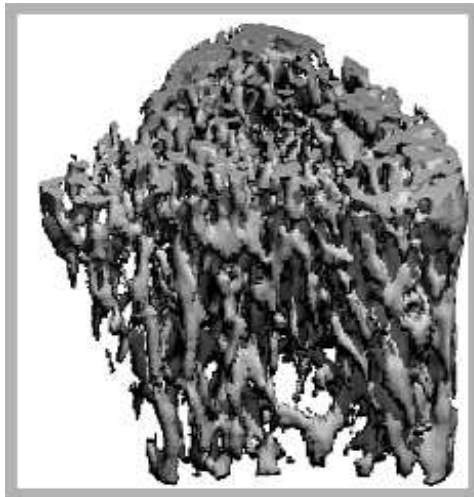
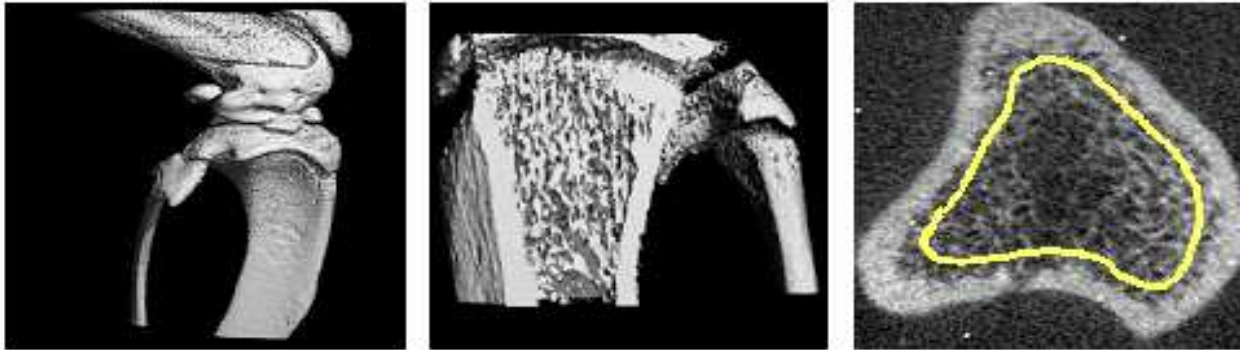
Progr. Coord.

- Just one example: new development by ERISTO for an **animal μ CT** validated on rats (J Bone Miner Res. 2003 Sep;18(9): 1622-1631. David V. et al.)
→non-invasive longitudinal studies replace former series methods: accuracy, cost decrease, ethical evolution



any real industrial application? Binot/ ESA Biotech.

Progr. Coord.



1-d.

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7-d.

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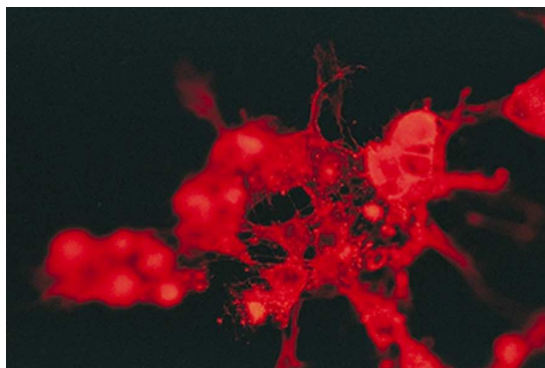
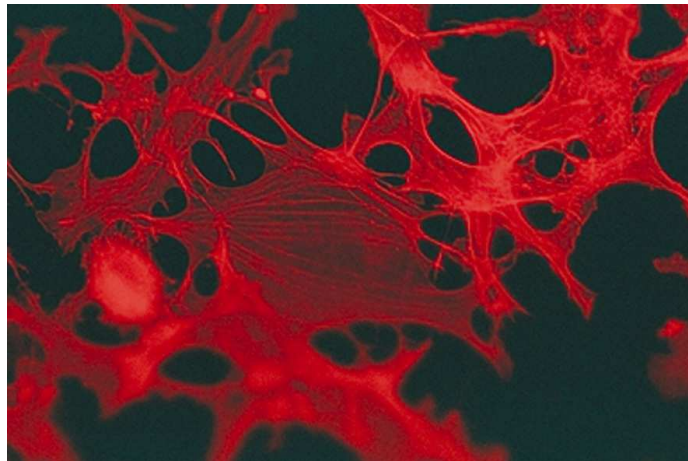


14-d.

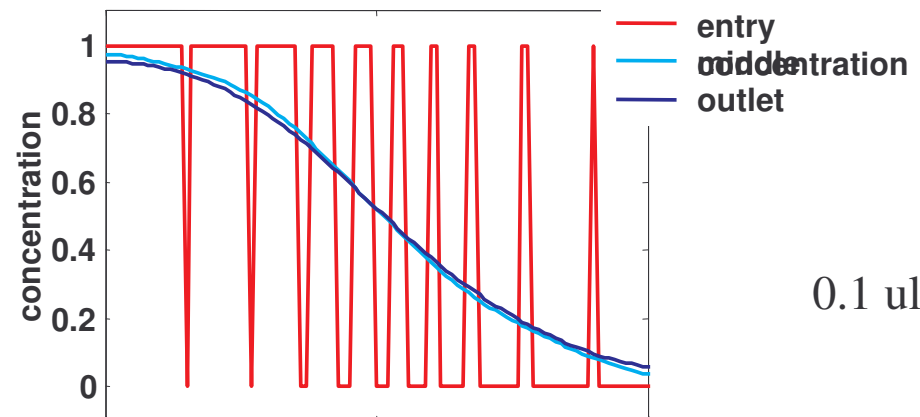
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Facility development: Gradient Bioreactor for research & drug testing

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Chondrocytes: osmotic shock protection by FSC; courtesy I. Walther, ETH



0.1 ul/s



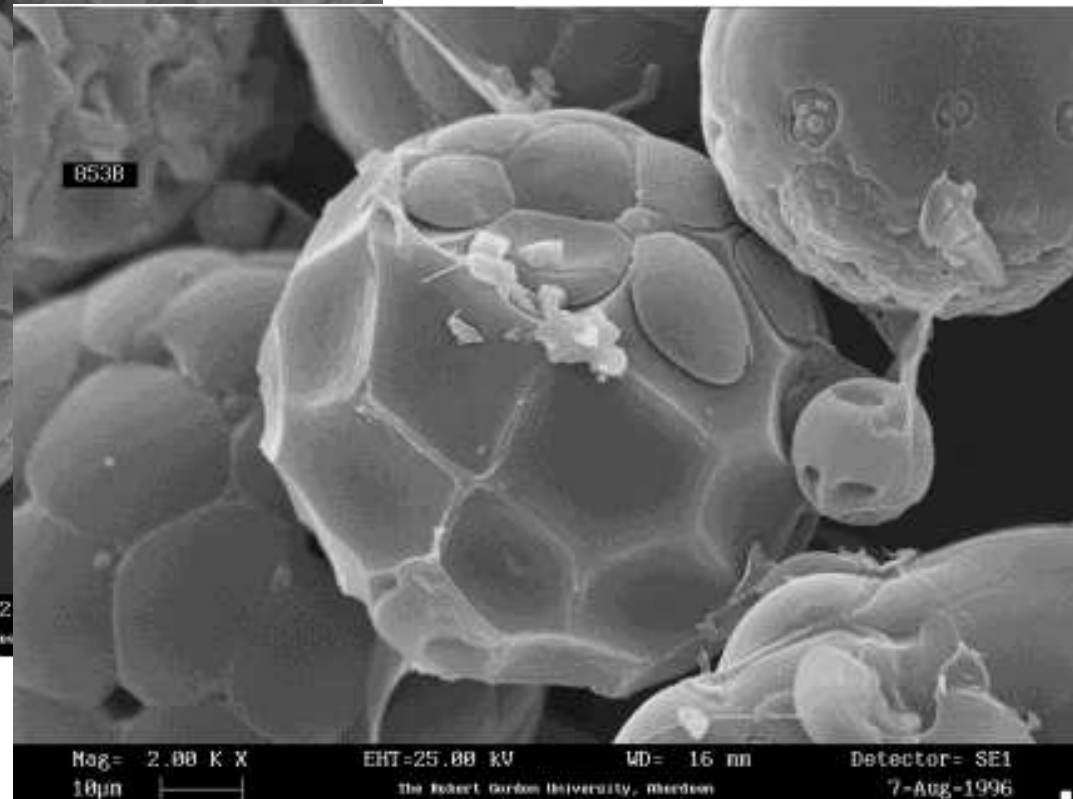
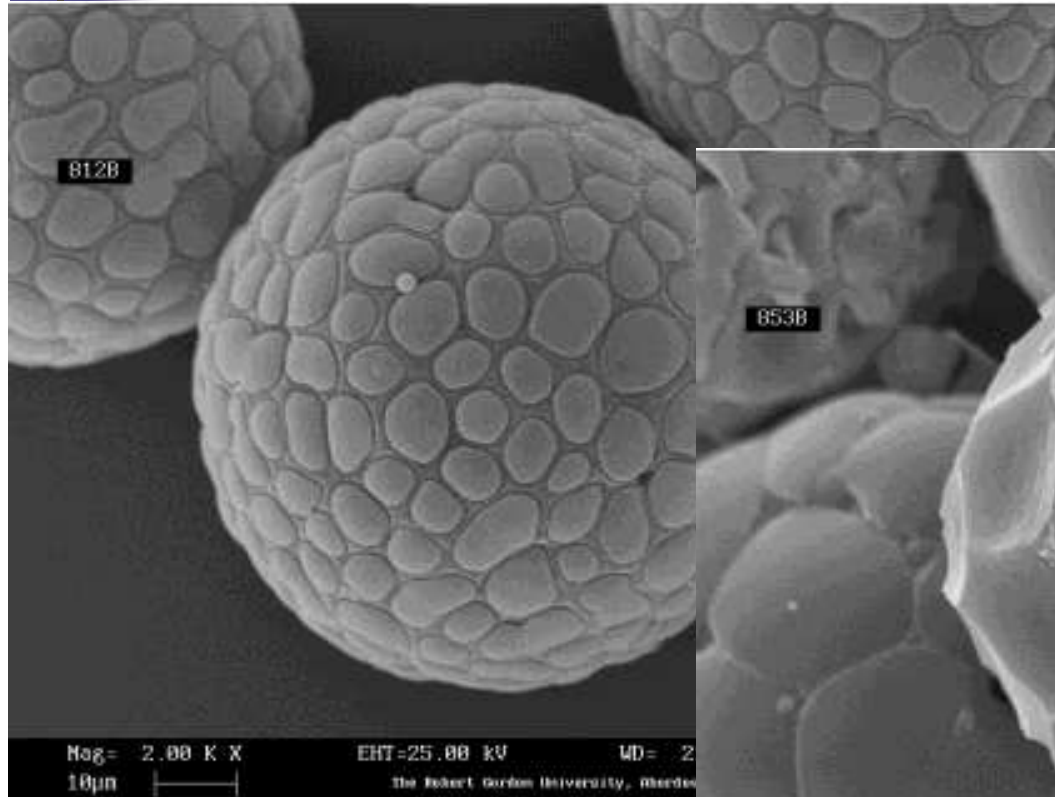
Domains or research/application for the ESA-BT

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- Tissue engineering [*LS* *BT*]
- Genomics [*LS* *BT*]
- Bone physiology [*LS* *BT*]
- New medical diagnostics [*PS* *LS* *BT*]
- Ageing problems and countermeasures [*LS* *BT*]
- Drug research [*PS* *LS* *BT*]
- Biological life support systems [*BT*]
- Solidification physics [*PS* *BT*]

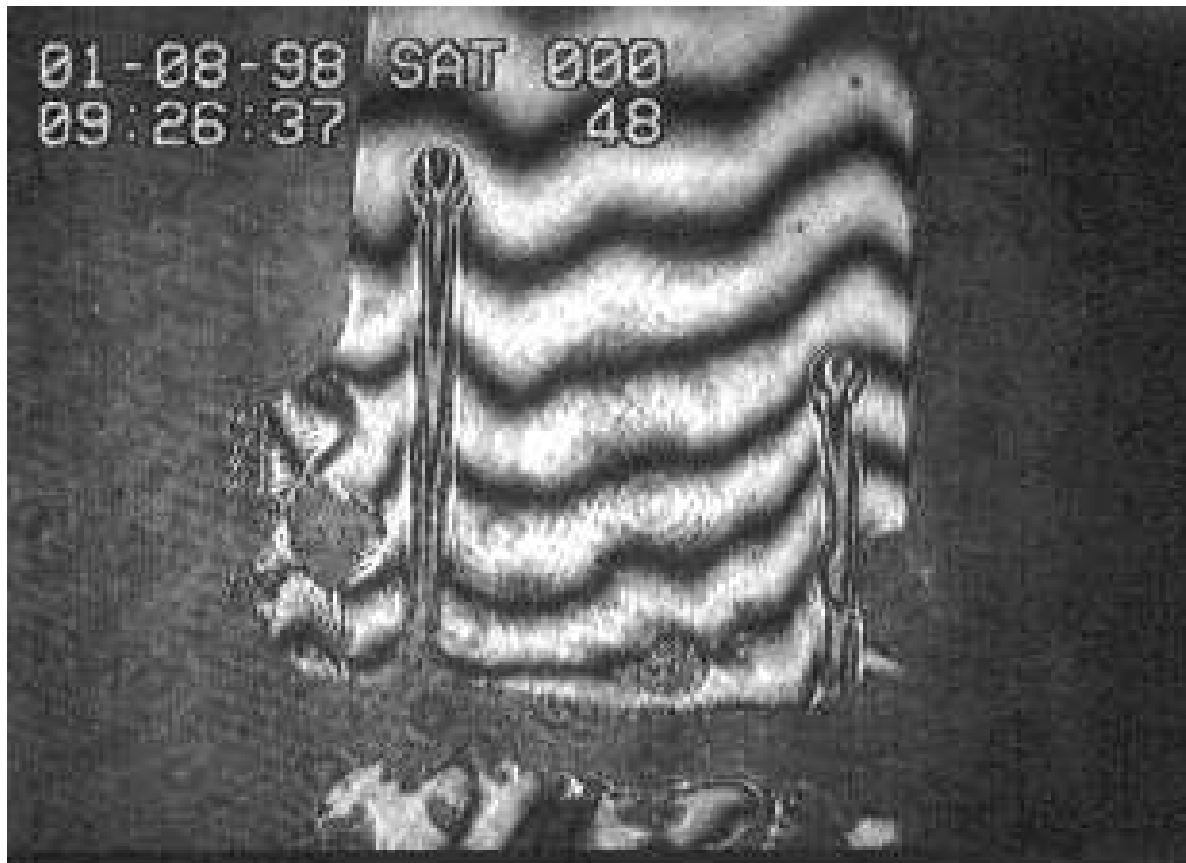
A last example: drug μ encapsulation

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And a last ? Have you ever thought of your process? Really? Are you concerned by μg ? or by g?

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Courtesy J.M. Garcia Ruiz,
Uni. Grenada



Les cinq enseignements clés

- European Space Agency: Europe's gateway to space → knowledge and technical capability to serve scientific, technological, and commercial use of space
- ESA Biotechnology Programme (ESA-BP): a recent interdisciplinary research field in the space research programme
- Partners to the ESA-BP: Scientific and Industrial Partners bring complementary expertise in natural (life & physical) and engineering sciences. IPR rules agreed beforehand between Partners
- Unique ESA contribution: access to unique space experimental conditions shown to influence basic physical and biological mechanisms, and to long-duration space exposure
- Sole model allowing complete suppression of the gravity dependant mechanical effects on any study models: cellular / tissular level up to integrated physiology



Pour en savoir plus

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- Sites Web:

for Science, I would recommend starting by:

<http://spaceflight.esa.int/users/file.cfm?filename=facgrbased>

for commercial aspects:

<http://www.esa.int/issbusiness>