

# Haysam AHMED

PhD student / ESR 7

PhD on

**Bioartificial liver device using progenitor cells  
or induced pluripotent stem cells**

**Aim & Things done**

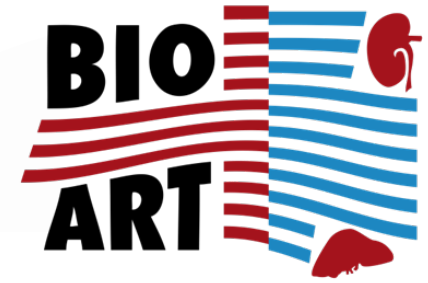
*October 2014*

**PhD start date: November 2013**

Institute on Membrane Technology  
University of Calabria, Italy



# BIOART



BIOART

(WP1)  
Artificial Kidney

(WP2)  
Bioartificial Kidney

**(WP3)  
Bioartificial Liver**

France  
(ESR8, ER3)

Germany  
(ESR9, ESR10)

**Italy**

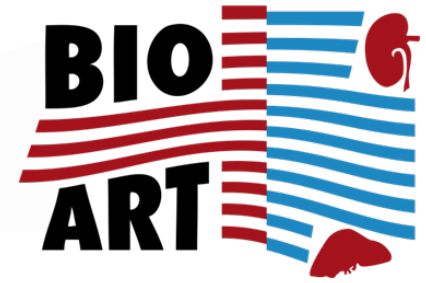
(ESR6) Mass transfer  
modeling & optimization  
(P5)

**(ESR7) In-vitro models using  
primary human liver cells  
and stem cells(P5)**

(ESR11) Dynamic model &  
Process Control (P7)

Supervisor: Dr. Loredana De Bartolo

# Goal and objectives



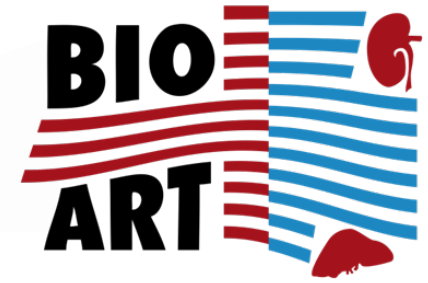
Bioartificial liver device using human cells in a hollow fiber membrane bioreactor

Microtissue Spheroids

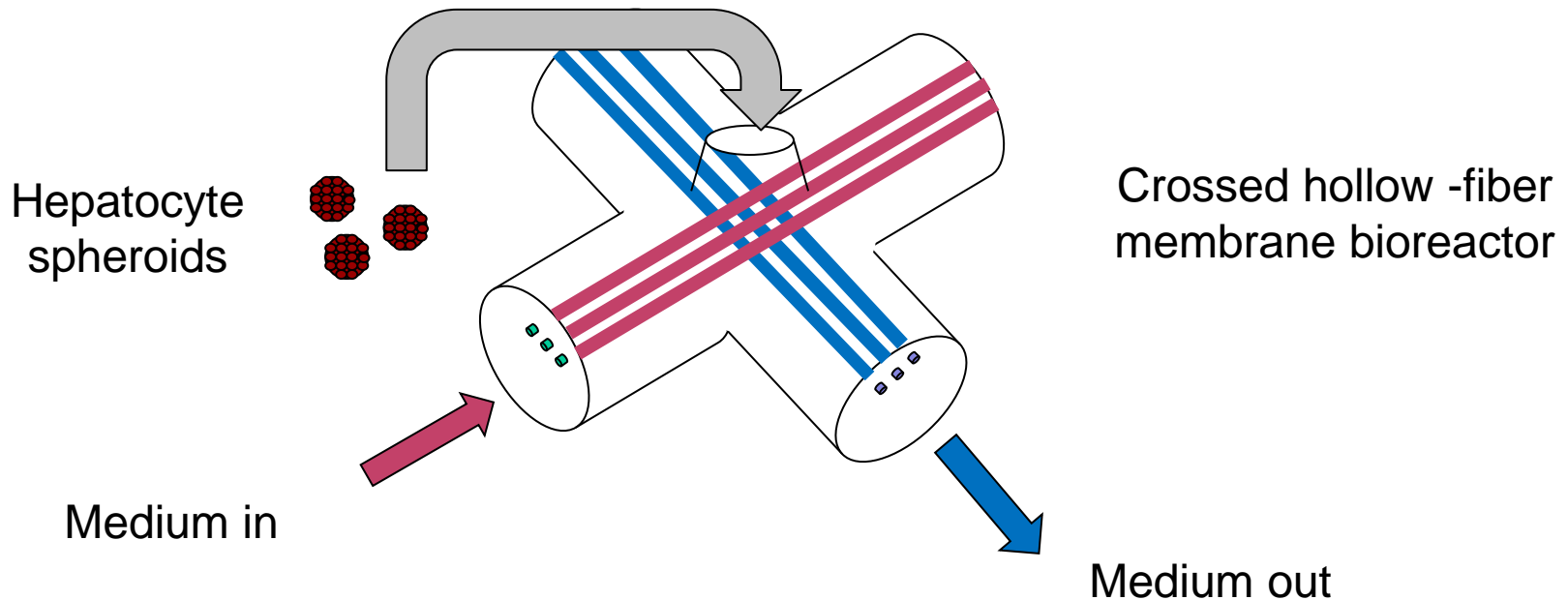
Organotypic culture

Stem cell differentiation

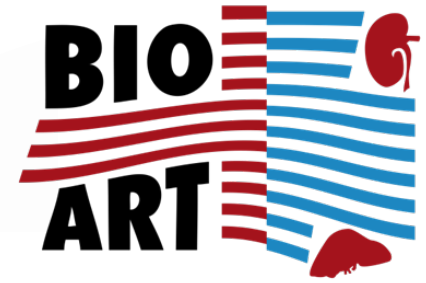
# Experimental setup



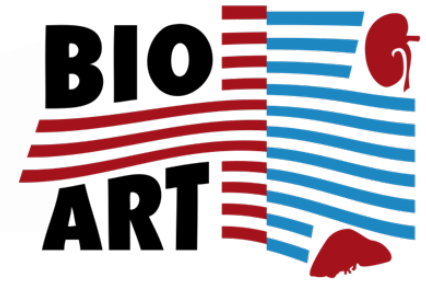
## Hepatocyte spheroids in PES/PES Hollow fiber membrane bioreactor



# Results

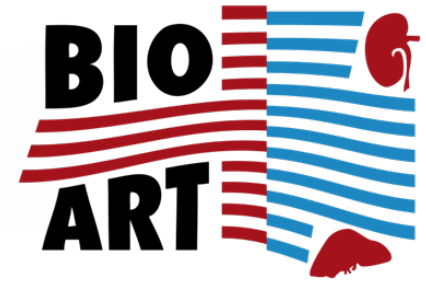


- Improved Urea synthesis and Diazepam metabolism of hepatocyte spheroid in continuous (dynamic) bioreactor as compared to the batch (static) bioreactor.
- Fusion of individual hepatocyte spheroids to form a microtissue in-vitro.
- Cells were viable and functional up to 16 days in culture.



- ITM-held lectures and seminars, November and December 2013, Rende, Italy.
- BIOART 3<sup>rd</sup> Network meeting, 28 January 2014, Nijmegen, Netherlands.
- Combined workshop BIOART and NEPHROTOOLS, 29-31 January 2014, Nijmegen, Netherlands.
- Secondment at the University of Leipzig: iPS cell differentiation, date yet to be determined.

# Work plan



- Co-culture of hepatocytes with non-parenchymal cells in a continuous bioreactor.
- Develop protocols for efficient differentiation of stem cells/iPS of different sources as well as progenitor cells into hepatocytes.
- Assessment of stem cell differentiation and hepatocyte activity via number of methods.