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TERMIS

6TH WORLD CONGRESS

MAASTRICHT

THE NETHERLANDS



BOOK OF ABSTRACTS



termis

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PREFACE LOCAL ORGANISING COMMITTEE

Dear participants of the 6th World TERMIS Conference 2021,

How we would have loved to meet you all in Maastricht, in a region where three countries meet, characterized by tradition and innovation. The Romans settled this region and for centuries, it was one of the most important political centers of Europe. Even today, Maastricht had an important role in making it possible through the Maastricht Treaty, which still represents today the cornerstone of collaboration, cooperation, and co-development across Europe.

How we would have loved to show you this special region, at the heart of Europe, where the Dutch University of Maastricht, the Belgian Universities of Liege and Leuven and the German RWTH Aachen University have created an epicenter of Tissue Engineering and Regenerative Medicine like only a few in the world. A fertile international ecosystem of academic, industrial, and governmental stakeholders that could be renamed the “Regenerative Valley” of Europe.

And how we would have loved to discuss, argue, network, laugh and celebrate with you during the breaks, evening events and casual meetings in the cafés of this wonderful old city of Maastricht; just what a lively (scientific) society like TERMIS is all about.

We had prepared all this for you and now this little coronavirus has thrown a spanner in the works. Nevertheless, or even more so now, we want to make the World TERMIS Conference a special event for you. An event that is still being held, but online leading us out of the isolation in our institutes back to scientific communing.

The general theme of the congress is “Biologically inspired technology driven regenerative medicine”, which is fully reflected in the 9 parallel thematic sessions. We want to stimulate a fruitful discussion between scientists and clinicians and industry representatives to foster the translation of ground-breaking ideas into clinical practice.

Enjoy the World TERMIS conference 2021...

...and we hope to see you soon face-to-face again!

Lorenzo Moroni

Liesbet Geris

Stefan Jockenhövel

PREFACE TERMIS PRESIDENT AND INCOMING PRESIDENT

Dear Participants of the TERMIS World Congress 2021,

On behalf of Geoff Richards, Tony Weiss and the entire governing board, we would like to thank our three organisers, Lorenzo Moroni, Liesbet Geris and Stefan Jockenhoevel for the TERMIS World Congress. It requires large amounts of work to host a TERMIS World Congress physically, but these three also had the extra work to then prepare for a hybrid meeting and unfortunately finally a fully online meeting. Our personal experiences of hosting meetings remind us how much work is involved but we did not have to prepare for a hybrid and/or online meeting. A big thank you to the three of you!

Thank you all who have prepared and submitted abstracts, symposia and workshops, for all those who have taken time to help review these abstracts and to all of you who have supported this congress by both registering and encouraging others to register.

It has been very difficult to run a Society during the pandemic without our usual three physical Chapter meetings and now with the World Congress going virtual, we have not had a face-to-face meeting since Brisbane in October 2019. Our normal income from these meetings was wiped out from one day to another, and we had to work hard to develop an alternative and more robust way to finance the Society that would work in all situations. The Governing Board decided to move to an annual membership structure for TERMIS, as most international societies have, to help our Society survive during difficult times. We therefore thank all of you who have paid your membership fees in 2020 and 2021 and encourage you to pay early in 2022 – these are essential to run the Society. This will allow you to attend all TERMIS conferences (face-to-face and virtual meetings such as webinars) at a special member rate.

In 2022 we will personally try to attend all three TERMIS Chapter meetings in Poland (TERMIS EU), Toronto (TERMIS AM) and Korea (TERMIS AP) and we hope many of you will be participating to help rebuild our in-person networking to strengthen our Society.

Geoff: As my last TERMIS Congress as the Society President I wish you a great online experience and hope to see you face to face in 2022.

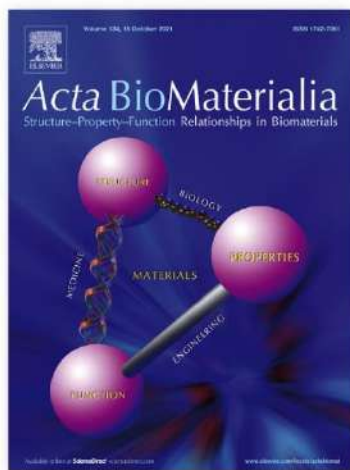
Tony: As the incoming President of TERMIS, I welcome you to our World Congress online and look forward to seeing you in person at future meetings.

R. Geoff Richards, President of TERMIS 2019,2020,2021.

Tony Weiss, incoming President of TERMIS.

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OPTIMIZATION OF 3D CANCER CELL CULTURE CONDITIONS BY APPLICATION OF CHEMICAL ENGINEERING PRINCIPLES

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Cancer cell immobilization in polymer hydrogels serving as extracellular matrices and cultivation in perfusion bioreactors that provide appropriate chemical signals, efficient mass transfer and hydrodynamic shear stresses is a promising strategy for development of physiologically relevant tumor models. In this work, perfusion cultures of 2 cancer cell types (C6 rat glioma and embryonal carcinoma NT2/D1 cells) immobilized in alginate microgels were established, while static cultures served as controls. Continuous perfusion had different effects on the cultured cells inducing enhanced proliferation of the glioma cells immobilized in microfibers (8×10^6 cell/ml), while reducing the viability of the NT2/D1 cells immobilized in microbeads (1×10^6 cell/ml). In order to elucidate the observed effects, chemical engineering principles were applied to assess mass transfer and hydrodynamic conditions. The second Fick's law was solved analytically while the diffusion-advection-reaction equation was solved numerically to model mass transport in the static and bioreactor cultures, respectively. Moreover, Reynolds numbers, pressure drops and shear stresses in bioreactor cultures were calculated for assessment of flow regime and hydrodynamic conditions. The modeling results have indicated that oxygen transport is diffusion-controlled through the alginate hydrogel, while medium perfusion improves mass transfer of larger compounds having smaller diffusion coefficients ($\sim 10^{-13}$ m²/s), which possibly stimulated glioma cell proliferation. On the other hand, the obtained shear stress (~ 50 mPa) in the perfused packed bed of microbeads was above physiological levels, which provided the explanation of the poor NT2/D1 cell survival. This study stresses the importance of multidisciplinary approach in addressing such multifactorial diseases as cancer.