

สรุปภาพกิจกรรม Visiting Professor
การบรรยายพิเศษในหัวข้อ
‘Organ on a chip technology: leaping forward in Regenerative medicine and
Cancer Research’
โดย Professor Minghao Zheng
UWA Medical School, The University of Western Australia, Australia

ผู้ประสานงาน
ผศ.ดร.ภาสรัตน์ คงขาว คณะแพทยศาสตร์

Special Seminar

Organ on a chip technology:

leaping forward in
Regenerative medicine & Cancer research

Professor Minghao Zheng

Director of the Translational Orthopaedic Research Centre
The University of Western Sydney, Australia



Tuesday 8th February 2022



1.00 PM – 4.00 PM



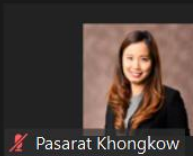
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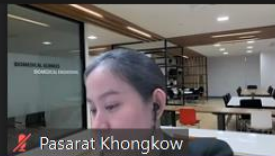
SCAN to JOIN US



QR for evaluation

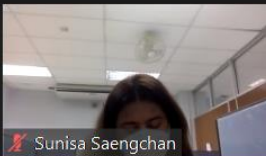


Pasarat Khongkow



Pasarat Khongkow

Hnin



Sunisa Saengchan



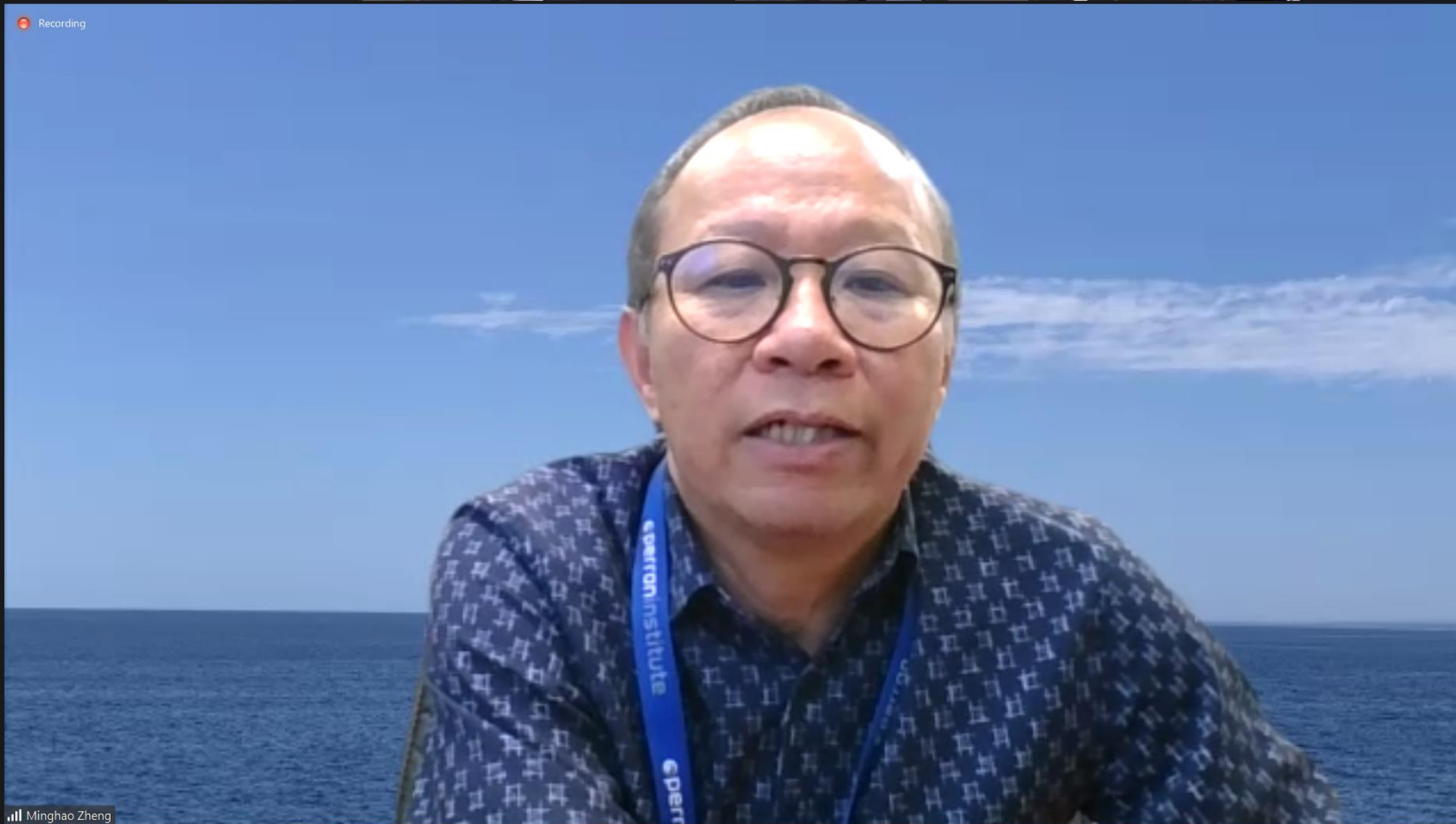
Thanaporn Khunpitak














Siwattra Pruksasri



Recording



Minghao Zheng

 <p>Minghao Zheng</p>	<p>med psu</p> <p>med psu</p>	 <p>Sunisa Saengchan</p>	 <p>Pasarat Khongkow</p>	 <p>#5 CARE BREATH_mooktapa PSU</p>
 <p>Thanaporn Khunpitak</p>	 <p>Siwattra Pruksasri</p>	<p>Natjira Tassanee...</p> <p>Natjira Tassaneesuwana</p>	<p>Socheatraksmey...</p> <p>Socheatraksmey Ung</p>	 <p>Chakrit Assbilly</p>
<p>Wanwara Thupti...</p> <p>Wanwara Thuptim dang</p>	 <p>Kajornkiat Maneechai</p>	 <p>Waritorn S.</p>	<p>6210110548</p> <p>6210110548</p>	 <p>Zak Bostan</p>
<p>Chompunud Cho...</p> <p>Chompunud Chompunud Na Ayudhya</p>		 <p>HILMEE ABDULLAH</p>		

Zoom Meeting

med psu

Recording

Minghao Zheng

Pasarat Khongkow

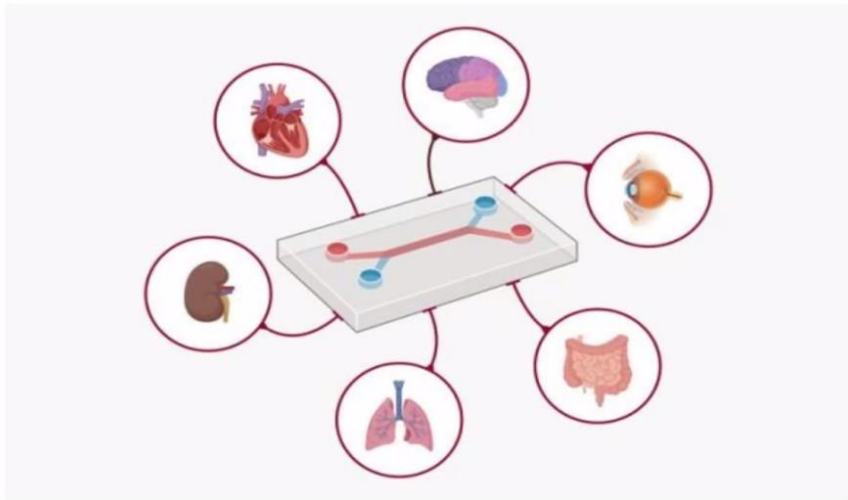
HILMEE ABDULLAH

Sunisa Saengchan

Siwattra Pruksasri

Organ-on-a-Chip to fill up the gap

- It is microchannels and/or chambers at the micron-scale size for cell culturing in a microenvironment similar to that of the cell's natural habitat.
- It allows visual and real-time monitoring and analysis of the cells.
- It is made of a biocompatible polymer material and are of a modular nature.



The diagram illustrates an Organ-on-a-Chip technology. A central, rectangular, transparent chip with internal red and blue microchannels is shown. Seven circular callouts, each containing a different human organ (heart, brain, eye, kidney, lungs, stomach, and liver), are connected to the central chip by thin lines, representing the integration of multiple organ systems on a single platform.

85°F Rain

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Zoom Meeting

med psu

Recording

Minghao Zheng

Pasarat Khongkow

HILMEE ABDULLAH

Sunisa Saengchan

Siwattra Pruksasri

- History of organ-on-a-chip
- Why do we want to develop organ-on-a-chip?
- Types of organ-on-a-chip
- Challenges and opportunities

85°F Rain 1:11 PM 2/8/2022

Zoom Meeting

You are viewing Minghao Zheng's screen

View Options

med psu

Minghao Zheng

Pasarat Khongkow

HILMEE ABDULLAH

Sunisa Saengchan

#5 CARE BREATH_moo...

Recording

100 Year ago...



Alexis Carrel (1873-1944)

- First Nobel prize winner of Medicine in USA.
- Organs from a person killed accidentally would be suitable for "organ transplantation" (1907).
- "Tissues or cells could be obtained from patients and grown *in vitro* from transplation" (1906).
- Ross Harrison proposed a term of independent cell growth later called "cell culture" (1908).

Unmute

Start Video

Participants 17

Chat

Share Screen

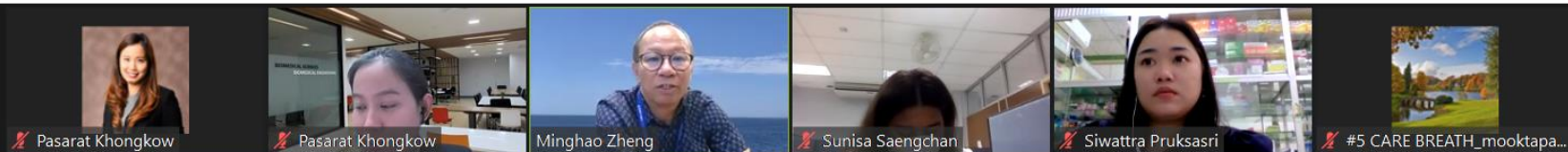
Record

Reactions

Leave

85°F Rain

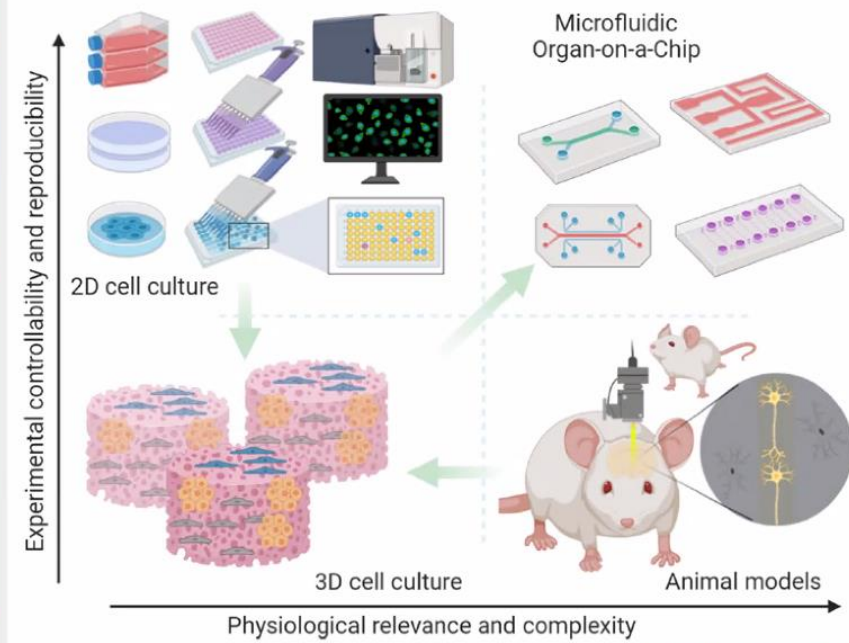
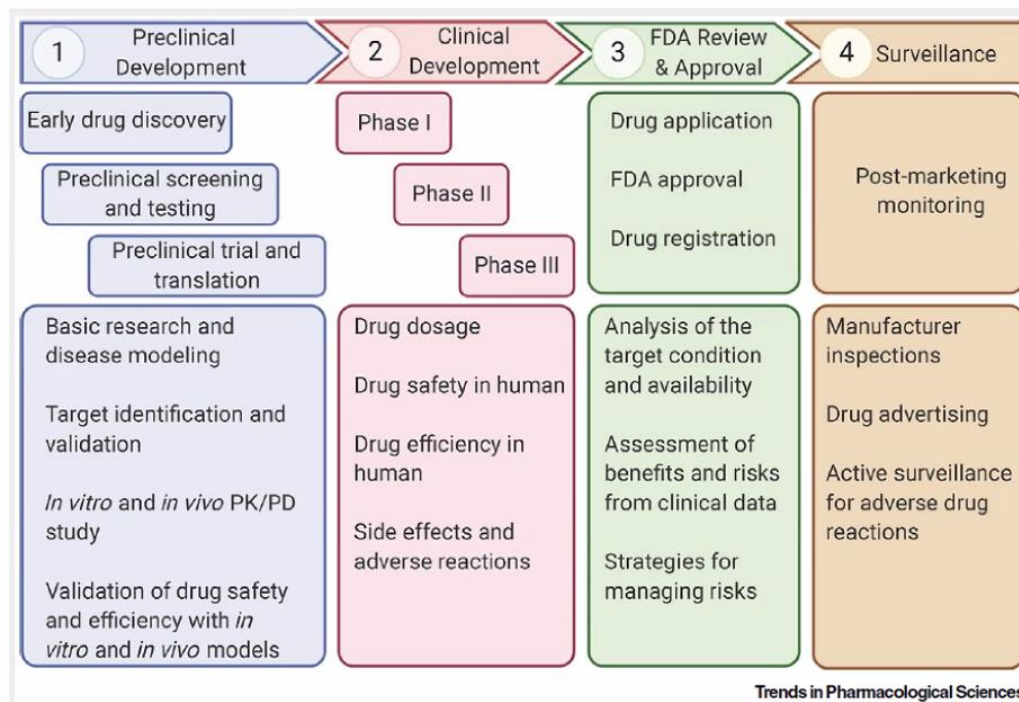
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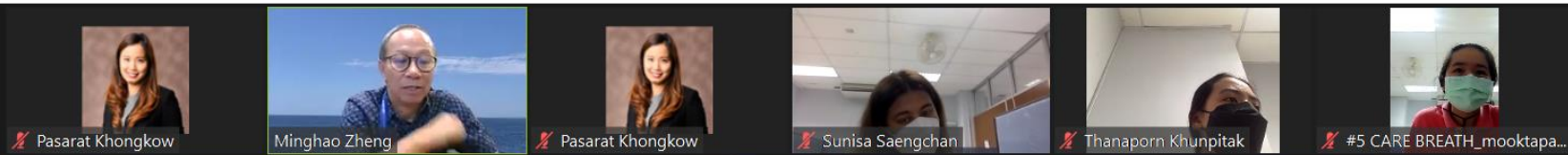


Review

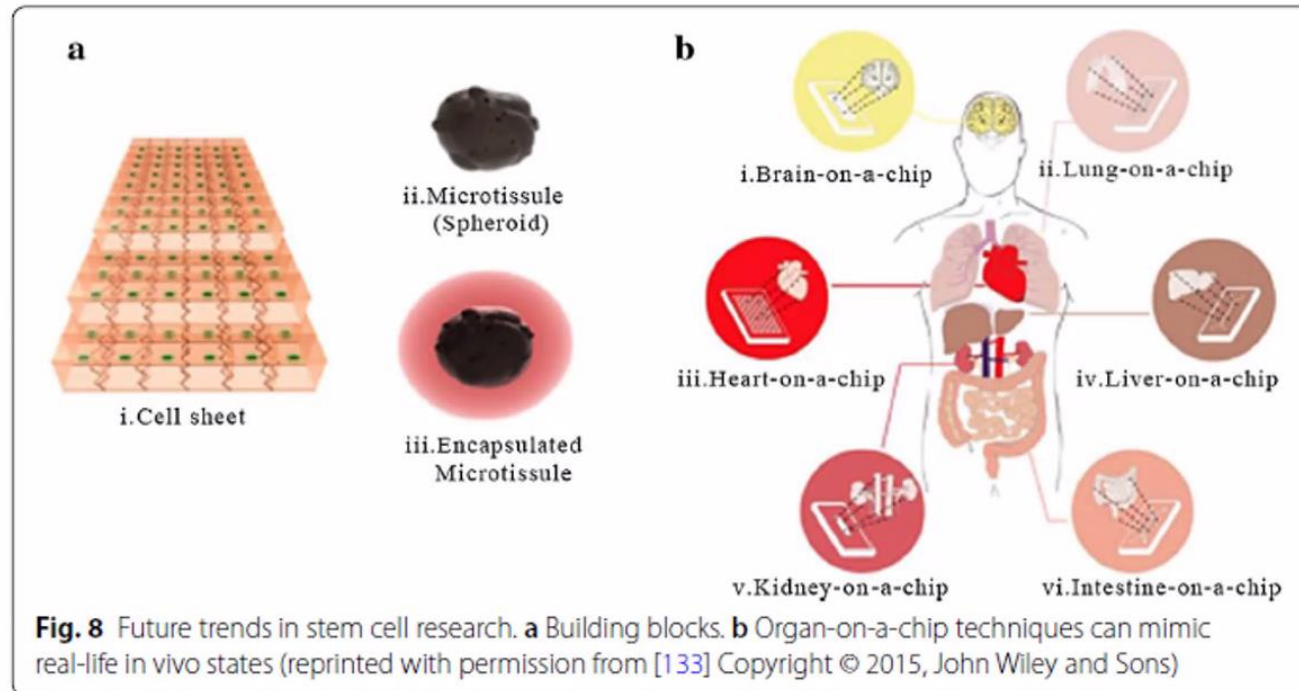
Organ-on-a-Chip: A New Paradigm for Drug Development

Chao Ma,^{1,2} Yansong Peng,² Hongtong Li,¹ and Weiqiang Chen^{1,2,3,*}





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Zoom Meeting


Recording

Minghao Zheng is talking...

Single-organ chips
Blood-air barrier
Blood-brain barrier

Multi-organ chips
Body-on-a-chip
Human-on-chip

Organ-on-a-Chip – transform conventional cell culture methods to 3D cell culturing techniques



Sunisa Saengchan

Thanaporn Khunpitak

Chakrit Assbilly

6210110548

Pasarat Khongkow

Chompunud Chompun...

Wanwara Thuptim...

6210110548

#5 CARE BREATH_moo...

Natjira Tassaneesuwan

Kajornkiat Maneechai

HILMEE ABDULLAH

Siwattra Pruksasri

Socheatraksme...

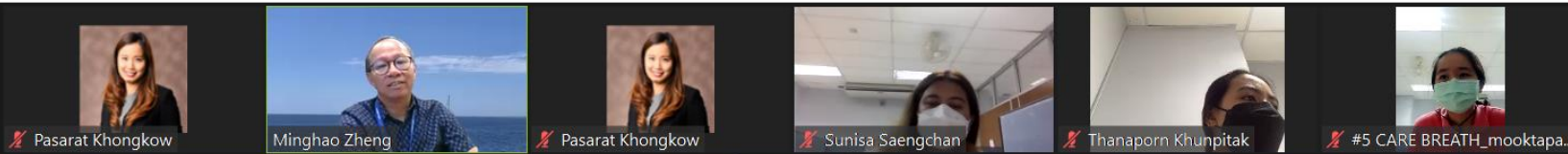
Waritorn S.

Hnin

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2/8/2022



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Challenges and opportunities

It is still remains to be realised

- **Design problems to be solved**

Cell patterning, dynamic mechanical stress, concentration gradient, Niche interaction

- **Biological parameters issues** (pH, oxygen, cytokines, shear force and metabolism)

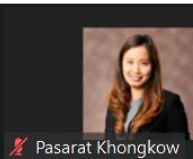
development in situ optical, electrical, chemical and biological micro-devices

- **Automation of Organ-on-a-chip devices for standardisation and repetition of outcomes**

Automation and large scale of devices, serum-free medium etc

- **Patient specific and tissue specific**

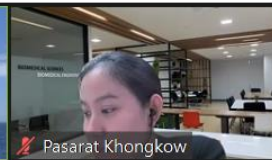
Stem cell organoid



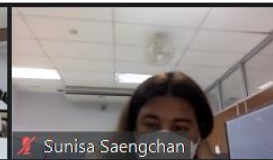
Pasarat Khongkow



Minghao Zheng



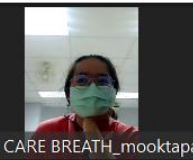
Pasarat Khongkow



Sunisa Saengchan



Thanaporn Khunpitak



#5 CARE BREATH_mooktapa...



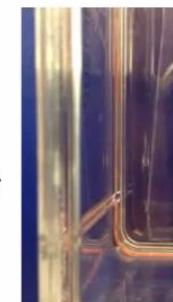
Generation of neo tendon tissue in a bioreactor 人肌腱来源干细胞 在生物反应器中产生肌腱组织



Tendon biopsy



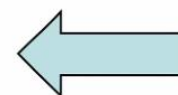
Cell culture



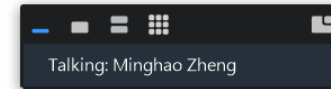
Making Cell sheet



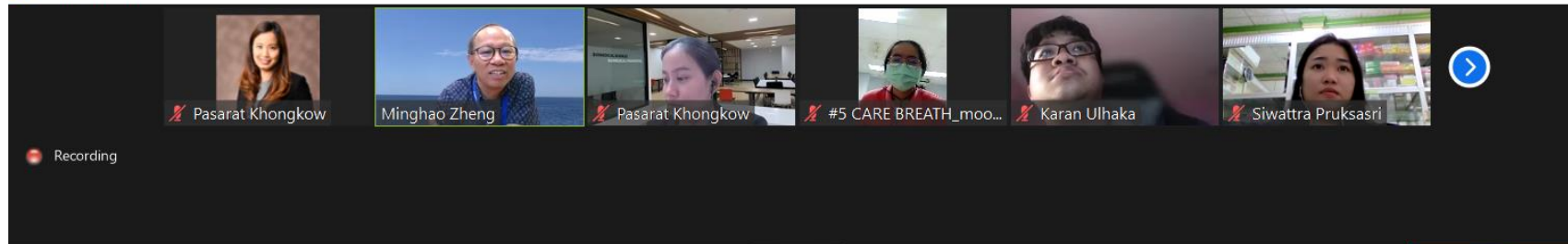
Assemble cell sheet



Background

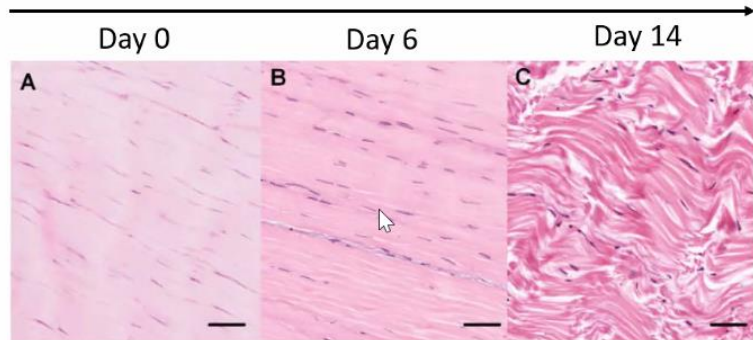


1. Tendon homeostasis and mechanical loading have intimate relation.
2. Tenocyte and tendon stem cell have the ability to sense mechanical signal.
3. Mechanical loading can either induce tendon diseases or favour tendon rehabilitation.
4. Determining the loading sweet point can further prevent tendon injuries and facilitate tendon health.
5. Bioreactor provides the possibility to investigate tendon mechano-biology and establishment the guideline for prevention of tendon injuries and tendon rehabilitation.



3. Determining 6% loading as a sweet point using bioreactor

Rabbit Achilles' Tendon explant without mechanical loading



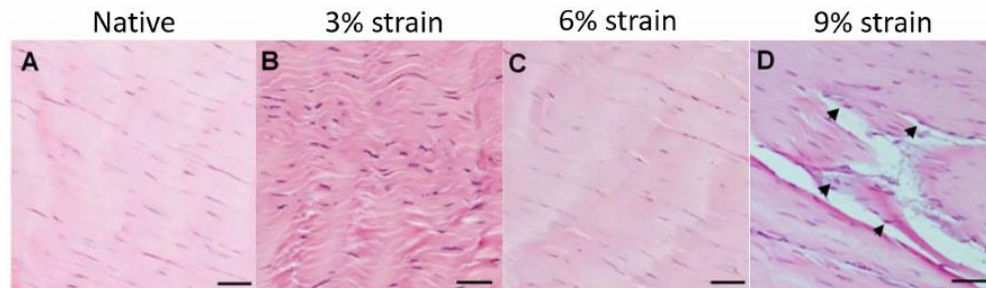
Progressive collagen disorganization

Progressive loss of native elongated cell morphology

Progressive decline on cell density

Rabbit Achilles' Tendon explant with mechanical loading

6 days mechanical loading



Near native collagen organization and cell morphology under 6% strain

Disorganized collagen fibres and rounded cell morphology under 3% strain

Micro-rupture presented under 9% strain

Chat

Me to Everyone

For the participants,
please provide us some
feedbacks here
<https://forms.gle/qKu26degNBn6CTQv9>

รบกวนทำแบบสอบถาม
หลังจบการ
บรรยายด้วยนะคะ

Pasarat Khongkow to Everyone



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3.33 KB



Wang, Tao, Zhen Lin, Robert E. Day, Bruce Gardiner, Euphemie Landao-Bassonga, Jonas Rubenson, Thomas B. Kirk et al. "Programmable mechanical stimulation influences tendon homeostasis in a bioreactor system." *Biotechnology and bioengineering* 110, no. 5 (2013): 1495-1507.

Who can see your messages? Recording On

To: Everyone

Type message here...

Zoom Meeting

You are viewing Minghao Zheng's screen

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Pasarat Khongkow

Minghao Zheng

Pasarat Khongkow

Natjira Tassaneesuwan

Thanaporn Khunpitak

Sunisa Saengchan

Chat

Me to Everyone

For the participants, please provide us some feedbacks here
<https://forms.gle/qKu26degNBn6CTQv9>

รบกวนทำแบบสอบถามหลังจบการบรรยายด้วยนะคะ

Pasarat Khongkow to Everyone

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Summary

1. Mechano-biology of tendon is an everlasting topic that addresses the intrinsic relation between tendon homeostasis and daily activities.
2. The advancement of bioreactor enable us to have an insightful view of how tendon resident cells response to different mechanical loading and lead to substantial change of tendon tissue.
3. Using the bioreactor, preclinical outcomes can be verified, modified and optimized before integration into clinical application.

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2:56 PM