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Simulating heart disease in a 3D model

Christine Maria Poch receives the 2024 Jung Career Advancement Award for Medical Research for her research into the heart using model systems

She is passionate about research – especially cardiology. With the development of innovative three-dimensional cell models based on 3D printing technology, Dr Christine Maria Poch simulates the complexity and functionality of the heart. In doing so, she not only creates valuable platforms for research into heart disease, but also the basis for new forms of therapy. She is currently working as a specialist in cardiology and clinical researcher at the Clinic and Polyclinic for Internal Medicine I at the Klinikum rechts der Isar of the Technical University of Munich. In recognition of her promising scientific studies in the field of cardiology, she is receiving the Jung Career Advancement Award for Medical Research 2024 from the Hamburg-based Jung Foundation for Science and Research. The award will support her research over the next three years with a total of €210,000, which Christine Maria Poch can use freely to continue her work.

3D models are booming: 3D-printed models are used in many ways in industry, architecture and art – and also in the production of technical medical devices and prostheses. Today, this method can also already be used to replicate human organs, which represents an enormous step towards even better treatment of diseases. Yet can these 3D models also help to explore new ways of regenerating a heart after a heart attack? This year's laureate, Dr Christine Maria Poch, is addressing precisely this question with her new project, 'Research into Cardiac Regeneration through Human Ventricular Progenitor Cells'. With a focus on 3D culture and tissue engineering, she uses human pluripotent stem cells (hPSC) to understand the complex changes in heart disease and develop new therapeutic options.

In the past, Christine Maria Poch has achieved success by developing 3D models that uncover specific disease phenotypes which remain hidden in traditional 2D cultures. Her work has identified key defects in the development of hypoplastic left heart syndrome (HLHS) – a life-threatening disease that can lead to death in the first few months of life. By cultivating native heart muscle tissue in 3D as true to life as possible in the lab, Poch was also able to investigate Duchenne muscular dystrophy and its effects on the heart in more detail and assess the effects of novel gene therapies using gene scissors. This disease usually manifests itself in childhood and quickly leads to muscle weakness and a reduced quality of life in a wheelchair.

In her next project, the Munich-based junior researcher now plans to use an innovative 3D myocardial scar model to further investigate the regenerative potential of human ventricular progenitor (HVP) cells and to study and optimise the cell-mediated cardiac regeneration process in real time and at the individual cell level. Ventricular progenitor cells have been shown to be very promising. The young researcher hopes to be able to produce optimised cell products for improved cardiac regeneration, and it is precisely this project that the Jung Foundation is supporting over the next three years. During this period, Christine Maria Poch will be able to freely use the €210,000 that comes with the Jung Career Advancement Award for her exciting research project.

In addition to Dr Christine Maria Poch, this year's Jung Career Advancement Award is also going to neurologist Dr Maximilian U. Friedrich, who is working at the Center for Brain Circuit Therapeutics at Brigham and Women's Hospital,

Harvard Medical School on the creation of an atlas of the neurological vestibular network. Both researchers will receive the full amount of funding.

A heart for patients – the career trajectory of Dr Christine Maria Poch

‘I gained my initial laboratory experience as a university student and was fascinated by stem cell technology, especially the possibility of differentiating cells into heart cells in vitro and seeing them beat in the Petri dish.’ When Christine Maria Poch talks about her research, you can feel the enthusiasm behind her every word. This first contact with cardiology developed further as she continued her studies and career, and her passion was awakened. ‘I am particularly fascinated by the ability to dynamically follow the behaviour of ventricular progenitor cells at a single-cell level. It is extremely exciting to be able to observe live how these cells recognise damaged areas in the heart muscle, migrate to them in a targeted manner and differentiate into functional heart cells,’ she says, explaining her fascination with the field and her research.

Born in Austria, she first studied pharmacy before switching to human medicine after just one year. From there, she made progress determinedly. She first completed her studies at Paracelsus Medical University in Austria in 2016 and then completed a doctorate at the Technical University of Munich in 2022. She graduated from both degrees summa cum laude and was recognised as a specialist in cardiology in May 2023. Her next step was specialist training for internal medicine. However, what drives her is not only scientific curiosity, but also, above all, the hope that the results of her research will alleviate someone’s suffering: ‘Despite the many possibilities offered by conventional cardiology treatments, they are in some patients not enough to compensate for the human heart’s lack of regeneration potential. I am therefore convinced that research into cardiac stem cells can open new avenues in the treatment of heart disease.’

Jung Career Advancement Award 2024 for an innovative project in cardiology

Even though the award opens new doors for her professionally, Christine Maria Poch prefers to spend her free time away from home, namely, exercising in the great outdoors. ‘Fortunately, Munich is not far from the mountains, so I’m usually out and about there on my days off.’ It doesn’t matter whether summer or winter – skiing, snowshoeing, mountain biking, hiking or jogging, – for her, the most important thing is to be out in the fresh air and enjoy the mountain panorama. Christine Maria Poch’s perseverance and inquisitiveness – as well as her ability to make friends and go about life empathetically – brought her to the position of the Jung Foundation for Science and Research honouring her with the Jung Career Advancement Award. ‘This award encourages me to continue my journey as a clinician scientist in research. It’s a great opportunity that can open up new opportunities for me, and I’m grateful for the opportunity to advance my career,’ she says, summing up the significance of the award for her future steps.

The Jung Foundation has been committed to advancing human medicine for over 40 years. With its awards and various scholarships, the foundation handles grants worth up to €650,000 each year.

Anhang Press release_Jung Foundation_Jung Career Advancement Award 2024_Christine Maria Poch
<http://idw-online.de/de/attachment102859>



Jung Foundation.Laureate Dr med. Christine Maria Poch
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