

PRESS RELEASE

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Breakthrough in the fields of Embryology and Regenerative Medicine from research at the University of Cyprus

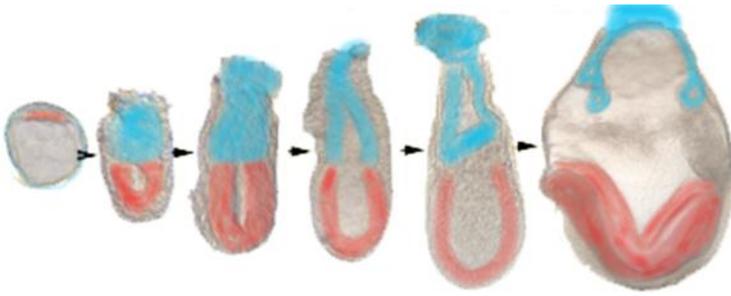
A step closer to understanding how the formation of functional organs initiates

A significant contribution to the fields of Embryology and Regenerative Medicine came from research on embryos conducted by researchers of the Laboratory of “Embryology and Stem cells” at the University of Cyprus that was recently published in the world-renowned scientific journal "*Nature Communications*". Head of the Laboratory is Dr Pantelis Georgiades, Assistant Professor in the Department of Biological Sciences of the ‘University of Cyprus’.

This discovery constitutes an important step towards understanding the cellular and genetic factors that bring about the completion of an embryonic process that is responsible for the initiation of organ formation, thereby bringing closer one of the main goals of Regenerative Medicine: the construction of functional organs in the lab.

A key aim of Regenerative Medicine is to revolutionize Medicine by making a reality the construction of functional organs (e.g. heart, liver, kidneys and lungs) by scientists for the purposes of replacing non-functional organs due to aging, disease, injury, or hereditary abnormality. However, this goal has not been achieved yet, largely because the factors that result in the formation of organs (organogenesis) are not fully understood. A prerequisite for understanding organ formation is through embryo research because, naturally, organogenesis occurs only within embryos. Research in Embryology (the study of the fascinating self-transformation of the simple, tiny and without organs, fertilized egg into a newborn, which is vastly more complex, much bigger and contains all organs) is expected to realize the above goal of Regenerative Medicine.

The discovery of Dr Georgiades’s research team - with a significant contribution from the doctoral student Christiana Polydorou – is concerned with a poorly understood process within early embryos, which is necessary for the initiation of the creation of all organs. This process is called gastrulation and involves complex movements and changes in the characteristics of embryonic cells (the cells are the structural and functional units of embryos and organs).



Early embryos before and during the initiation of organogenesis: Mouse embryos before gastrulation (first three from the left), during gastrulation (fourth and fifth) and at the start of organogenesis (last). The blue area is destined to become placenta and the fetus (and all organs) comes from the red area.

The main results of Dr Georgiades's research showed for the first time, worldwide, that: (a) The cellular area destined to become placenta (organ situated outside of the fetus that is shed immediately after birth) has an additional new role: to send informational signals to the cellular region destined to undergo organogenesis and become the fetus, for the purposes of completion of gastrulation and therefore the start of organogenesis. (b) The identification of the gene named Ets2 as the first gene that is necessary for the completion of this novel cell signaling.

In conclusion, this discovery accomplished mainly two goals. First, in terms of Embryology, it contributed to the understanding of genetic basis of the most frequent pregnancy complication (first trimester spontaneous unexplained miscarriages) because in the absence of a functional Ets2 gene, the aforementioned novel embryonic process fails and therefore no organs are formed, thereby resulting in early embryo death. Secondly, from the perspective of Regenerative Medicine, this discovery took an important step toward understanding the cellular and genetic factors that result in the initiation of the formation of all organs, bringing closer the much-desired goal of manufacturing functional organs by scientists.

This research used cutting-edge experimental methodologies and was funded by the University of Cyprus, the Cyprus Research Promotion Foundation and the European Regional Development Fund of the European Union.



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Brief Biography:

Dr Pantelis Georgiades is currently an Assistant Professor and head of the "Embryology and Stem cells" research Lab at the Department of Biological Sciences of the "University of Cyprus. He obtained his BSc. Hons

degree from the School of Biological Sciences of Queen Mary, University of London (UK) with a scholarship for undergraduate research from the "Gatsby Charitable Foundation". He then obtained his PhD degree in "Developmental Biology" (from research in Prof. Paul Brickell's Lab) from the Department of Molecular Pathology at UCL, University of London (UK), whilst being a recipient of scholarships from the "Wellcome Trust" and the "A.G. Leventis Foundation". Subsequently, Dr Georgiades carried out research in "Embryology, Placentology and Epigenetics" as a postdoctoral Fellow (scholarship from the "Wellcome Trust") at the Department of Anatomy (with Prof. Anne Ferguson-Smith and Prof. Graham Burton) of the University of Cambridge (UK). He then carried out research with Prof. Janet Rossant in "Extraembryonic tissues and Stem cells", whilst receiving a scholarship from the Samuel Lunenfeld Research Institute of Mount Sinai Hospital (Canada). Dr Georgiades has published in several peer-reviewed scientific journals including "*Proceedings of the National Academy of Sciences of the United States of America (PNAS)*", "*Development*", "*Placenta*" and "*Nature Communications*".