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PARENTAL RELATIVE ATTRIBUTION IN MODERN ARTIFICIAL REPRODUCTIVE TECHNIQUES; EPIGENETIC CONCEPTS AND NEW LEGAL CONSEQUENCES

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ABSTRACT

Background: During recent decades, great improvements in the form of artificial reproductive techniques (ARTs) occurred in the field of infertility treatments, which changed the concept of conventional double parenthood. Concerning the genetic relative contribution of each interfering parent to evolution of the ARTs fetuses, now complex legal and jurisprudential issues on the child descent and custody revealed. ***Materials and methods:*** A systematic applied qualitative approach over the nature and interactions of interfering legal and medical elements in descent determination in most complicated ART guided pregnancies planned and comparative study on relative physiologic and genetic contribution has been set. Then specific data gathering and classification in the form of surveys conducted. ***Results:*** A set of extracted concepts is presented to jurisprudential bodies which confirmed and formed the puzzle of the legal authorities' opinions towards the issue. In the next step a re-structured model of fetal evolution with adding the modern epi-genetics issues to the conventional pattern of double parenthood is provided. ***Discussion:*** Genetics and epi-genetic events have been considered as major determinants in our cells' fate, differentiation and behavior all over our lives. Regarding these deep effects over somatic and psychological status, and character, the role of epi-genetic ultra-structural alterations from intervening contribution elements like surrogate womb, ovum cytoplasm and other parameters may considered as vital and most profound. This fact will change our attitude towards the current jurisprudential state matrix by taking some new epi-genetic parameters into account as a source of influence on embryo nature and nurture which might be implicated in child descent and custody.

KEY WORDS: Artificial Reproductive Techniques, Epi-genetics, Law, Descent, Custody.

INTRODUCTION

Scientific findings in recent decades have led to great improvements in the form of artificial reproductive techniques (ARTs) in the field of infertility treatments through various procedures. [1] These advances need complex combination of physiologic fertilization processes with more than two conventional parents in many cases. Situations like this may happen in the case of womb surrogacy or three parents' fetus and accompany by emerging new legal questions and ambiguous conceptions. [2]

Different scientific studies suggest so many effective variables herein so one important notification would be the genetic relative share and contribution of each interfering parent to evolution of the ARTs fetuses. [3] At present, scientists recognize some important genetically variables which interferes with the biologic process of child's cellular differentiations, organs formation and even psychology characteristics and personality specifications which could be considered in the fate of fetuses.

To so many infertile couples, first line reproductive technologies IVF, and micromanipulation imposed profound influences on therapeutic and diagnostic protocols but in recent decade womb surrogacy, Oocyte donation and triple parent child bearing techniques gradually becoming more prevalent. [4, 5] Also there are more complicated technologies of embryo evaluation for Pre-implantation Genetic Testing (PGT). In these approaches, key elements like gene mapping and DNA replacement technologies, mitochondrial replacement techniques (MRTs), Pronuclear Transfer (PNT) and Maternal Spindle Transfer (MST) and Ovarian tissue transplantation (OTT) have led to novel ethical and legal challenges, because of genetic materials mixture of more than conventional biologic parents. [6, 7]

All these modern procedures have been practiced for many years all over the world but there are still some controversies concerning critical issues such as kinship and inheritance, [8] although the complex ethical guidelines and proper legislative considerations are gradually being shaped in different countries and cultures. [9] Respecting to the deep differences among world attitudes towards the ART legal consequences, especially in the case of strong law and religion interventions, concerns on the relative shares of each contributing element in the evolution of fetus, should be reconsidered using a multiplex matrix. [10]

Another example of these ambitions would be uterus transplantation as an experimental treatment method which is the only legal alternative for candidate women. On the other hand, surrogate pregnancy is connected with many medical, ethical, legal, religious and social controversies in the great part of the world. [11] Regarding these facts, one may find so many necessities in modification of terminology and basic concepts on the process of embryo growth and evolution which is affected by many genetics and epi-genetics parameters with strong but not well defined effects. [12] Up to now the descent and legal status determination pattern of fetus in classic conceptual framework, based on classic parameters such as paternal genome, maternal genome, and mitochondria.

The new horizons in current model of descent determination

Although explaining and defining the concept of genera and descent seemingly easy but in fact it is one of the most complex ones. The concept of relation due to its value and importance in the conditions of life has been considered as a critical issue and is emphasized in all countries, cultures and religions. [13] In classic situation, the child who born as a result of spouse germinal cells fertilization attributed to the owners of cells and will enjoy a series of rights such as inheritance and the right of parents' custody. [14]

By commencing the new era of epi-genetics with its powerful interference in fetal evolution process, juridical bodies encountered several complicated views on the ART child issue especially in the case of manipulated ovum or surrogate womb. [15] Early studies show that many factors, including epigenetic events, can influence the development of fetal futures in terms of physical, social and biological dimensions. So far, these events have influenced the physical development, evolution of morality and psychological development, tendency to disease and even different lifestyles like future economic status, or social behaviors. [16, 17, 18]

In this research we try to elucidate the legal authorities' opinions on the intervening epigenetic factors and their relation to legal aspects in the fate of the fetus, especially in most complicated ART procedures.

MATERIALS AND METHODS

This investigation includes a systematic applied qualitative approach focuses on analyzing and reconsidering the in-depth understanding of the nature and interactions of interfering legal and medical elements in descent determination and parental rights in the case of most complicated ART guided pregnancies. Our research consists of specific data gathering and classification in the form of surveys conducted through providing a valid set of questions. In the first step, so many comparative documents on relative physiologic and genetic contribution of each parent to determining the laboratory child's descent have been sorted. Then intervening parameters specified and their relevance to the issue considered carefully.

Study population in this investigation includes the specialists and juridical authorities to re-evaluate the basic scientific framework for laboratory child's descent determination according to molecular biologic modern findings. In the next stage a re-structured model of intervening parameters provided to them and to detect their viewpoints toward this model, a valid questionnaire has been produced based on 5 point scale. Then the results extracted and analyzed through SPSS software.

The sum of the scores will reflect the overall opinion of the law and juridical authorities towards the newly model suggested by the epigenetic model of descent determination.

RESULTS

Extracting and analyzing the raw data , resulted in a set of concepts which showed a whole puzzle of the legal authorities' opinions towards the new intervening model of fetal evolution in the most complicated ART children like mitochondrial replacement techniques (MRTs), Pronuclear Transfer (PNT), Maternal Spindle Transfer (MST) and Ovarian tissue transplantation (OTT) issues. The most important provided findings were:

- ***Extent to which, juridical authorities are aware of the impact of genetic and epigenetic factors on the relative contribution of the third parent to the development and differentiation of the fetus.***
- ***Acceptability rate of new genetic and epigenetic findings impact on the relative contribution of the third parent in the development and differentiation of the fetus***
- ***Interference mechanisms of these genetic and epigenetic factors along with other factors to form a new legal framework in the contribution of extra-parent with the main biological parents***
- ***A predicting framework in mode of new genetic and epigenetic factors in non-classic matrix set of parameters for relative contribution of extra-parent to the development and differentiation of the fetus.***

In general, among the new matrix set of factors that influence the relative contribution of each parent to the development of the ART fetus, the epi-genetic factors take a high practical score and placed along with other main legal elements.

The jurisprudence authorities' responses indicated an overall agreement on strong practical impact between classic parameters and modern epi-genetic factors in determining a modified framework for ART child descent and relative attribution of every parent in the issue.

DISCUSSION

Genetics and epi-genetic modifications throughout our lives have been considered as major determinants in our cells' fate and behavior in many medical studies. Epi-genetic concepts at present provide us a great tool to explain delicate changes in gene expression systems, with trans-generational extension. These modifications on the other hand include presumably permanent alterations to the genetic material or nearby ultra-structures which is influenced by the environment and transmitted through cell replication. [19, 20] It should be considered that genetics regulates the development and diversity of important biological and evolutional processes like neuropsychological phenomena which give the cells and organs a great potential to develop different patterns of growth and shows many aspects of traits and individual talents which may associates with the concept of fetal life fate and characteristics inheritance. [21, 22] In fact genomics and epi-genomics processes with wide range of stable modifications in phenotypes, interfere with the regulation of the cell's behavior , capacities and differentiations and lead to fine tuning of various internal phenomena like cell cycle, signaling pathways, cellular divisions and genetic suppression or augmentation. [23]

From the above findings, it can be concluded that in many cases, epigenetic profiles in different conditions in the development of ART child, as well as the three parents' child, can determine the fate of the fetus and how it develops. Thus, it can be assumed that the role of the uterus and the role of mitochondrial and epigenetic inheritance in the evolution of the egg is beyond a simple and temporary process rather an influential effector on the nature of cells. This important fact, it will change our attitude towards the current state of legal decision making matrix by taking some new epi-genetic parameters into account as a source of influence on embryo nature and nurture, Perhaps associates with new views of the jurisprudential authorities and religious scholars. Regarding these modifications our research proposed a new re-structured model of elemental matrix affecting the development, differentiation and formation of the embryonic organs by adding some epi-genetic parameters.

On the other hand so many complementary future studies are needed to provide an ideal and comprehensive feasible model of parameter interactions applicable in jurisprudential decision making and each parent sharing determination.

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