

# Epigenetic and birth

## Abstract

Epigenetics refers to the study of how genes express their phenotypic effect, all of which can be modified by the environment. Recently, pregnancy, labour and birth have been proposed as critical periods of exposure to environmental or external factors and interventions that could cause epigenetic changes in an individual, determining their potential for a healthy life. In this mini review, exposure to exogenous oxytocin during labour and also during caesarean delivery is posed as epigenetic modifiers, and their potential impact on the health of an individual is reviewed.

**Keywords:** epigenetic; birth; caesarean section; oxytocin

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## Introduction

Epigenetics has been described as one of the mechanisms regulating fetal adaptation to the environment,<sup>1</sup> modulating gene expression, either repressing or activating the expression of genes without changing the DNA, which is potentially transmissible to future generations.<sup>2</sup> Knowledge of epigenetic modifications could explain how the intrauterine environment influences adult health. In a hypothetical exercise, this allows to relate not only pregnancy, but the type of delivery and birth environment as periods that could expose a woman and her child to such modifications, regardless of its duration.<sup>3</sup> Thus interventions performed during labor, may be associated with activation of epigenetic mechanisms that alter gene expression of an individual conditioning its potential healthy or disease-free life.<sup>4</sup> One of these interventions is the use of exogenous oxytocin during labor and in caesarean delivery, which have increased significantly in many countries.<sup>5-7</sup>

In 2013, Dalhen et al.,<sup>6</sup> published the Epigenetic Hypothesis of Birth, which proposes that when labor occurs naturally, physiological stress processes are stimulated in the fetus, which determine physiological epigenetic expressions that would trigger their immune response as well as genes involved in weight regulation and tumour suppression or rather in suppressing exaggerated cell replication.<sup>3</sup> Meanwhile, the use of exogenous oxytocin has been associated with deregulation of these processes and changes in perinatal linkage,<sup>8,9</sup> delay in the onset of lactation,<sup>10</sup> increased postpartum post-traumatic stress<sup>9</sup> and development of bio-behavioural disorders in autism spectrum and attention deficits;<sup>11,12</sup> It is postulated that the oxytocin receptor gene may undergo epigenetic modifications responsible for these changes.<sup>3,4,12</sup> On the other hand, caesarean delivery has been associated with impaired immune response<sup>13</sup> and possible alterations associated with deregulation of stress processes that are part of normal delivery and absence of exposure to bacterial vaginal flora.<sup>3,4</sup> All this is conditioned by abnormal epigenetic modulations of the genes involved in these processes.

## Conclusion

Considering the recently raised issues, it is fundamental that health

professionals reconsider the use of procedures such as pharmacological stimulation or reinforcement of labor, cesarean birth, or any event with the power to condition dysregulation of physiological process of eu-stress of labor, because it could be related to modifications of normal, potentially transgenerationally transmissible gene expression and whose impact in the medium and short term is not possible to measure in today's society.

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## Conflict of interest

The author declares no conflict of interest.

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