

David Barker: the revolution that anticipates existence

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“The womb may be more important than the home”
David Barker

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It was a shock to learn that on August 27, 2013, life abandoned David Barker, the man who “anticipated” the existence of babies by focusing attention on the importance of the fetus and what takes place during intrauterine life. Undoubtedly for him, Horatio’s phrase “*Non omnis moriar*”, was invaluable: Barker was one of the physicians who in the last decades brought about the greatest changes in medicine, changes so important as to represent a veritable revolution in medical thought. “Barker’s revolution” took place in 1995, when at the age of 57 (he was born on June 29th 1938), he published in the *British Medical Journal* an article so important that his thesis was defined as the “Barker hypothesis” [1]. At the beginning, as is the case with all great discoveries, Barker’s idea was controversial and hotly debated, but in the end it was accepted by the majority of physicians and scientists. It also modified the way of conducting research, prevention and clinical medicine.

Barker studied 13,517 men and women born between 1924 and 1944 at the Helsinki University Hospital. The method he followed in the study was original. He had asked some historians for help in reconstructing the anamnesis of patients using available documents: clinical records, hospitalizations, drug prescriptions and causes of death. Barker’s conclusion was surprising, unexpected and innovative: the possibility of developing cardiovascular or metabolic diseases, such as diabetes, was related to conditions in the embryonic stage. The study reversed all the clinical and preventive acquisitions reached up to then and imposed preventive and therapeutic strategies starting from the beginning of pregnancy.

To illustrate not only the scientific and ethical impact of Barker’s discovery, but also to understand his personality, we must describe medical thought and the socio-cultural context of the 1960s and 1970s, the years in which Barker published his first article in *Nature* (1961), and became a researcher in the department of social medicine at the University of Birmingham (1963), where he remained until 1979, when he became a professor of clinical epidemiology at the University of Southampton.

According to Barker’s studies, the embryo obviously has a genetic complement coming from the mother and father, but from the very first stages of development it begins to undergo the influence of the outside environment, just as occurs for adults whose biological, psychological and pathological aspects are influenced by the environment to a not well-established percentage between genetic

complement and epigenetics. Thus the embryo possesses within it all the genetic information coming from its family heritage, but from the time of conception it is influenced by the mother’s nutritional conditions, which are in turn determined by her socioeconomic context. Barker illustrated his research by comparing the embryo to the automobile which must be well put together to move in all environments, even damaged ones: the well-built models do not break down while the others may.

If Barker’s discovery was revolutionary from the cultural standpoint, it was even more so from the strictly medical one. Not only was it necessary to change all the preventive strategies and focus more on the first period of life, but it was also necessary to reconsider the role of genetics to the advantage of the environment. Also debunked was the idea that to be in good health and live a long life it was necessary to choose the right parents: after Barker’s research we must add that it is not only best to choose the right parents, but also to find a favorable environment and good travelling companions. Genetics proposes, but epigenetics disposes. Genetics is written in ink and cannot be cancelled, while epigenetics is written in pencil and, if we so desire we can erase it and rewrite it: we cannot change our past but we can modify our future [2].

Barker’s research method was rigid from the methodological standpoint, but innovative and speculative in its working hypotheses, with a humanistic slant. Over the years, thanks to his brilliant intuitions, the concept of perinatal programming has become more and more accepted as: “The response by a developing organism to a specific challenge during a critical time window that alters the trajectory of development qualitatively and/or quantitatively with resulting persistent effects on phenotype” [3].

Much of our future lives as adults is decided in our mothers’ wombs. For example, alterations of the growth balance in the first three months of pregnancy, in the sense of hyponutrition, are associated in adult life with cardiovascular diseases, high blood pressure, dyslipidemia and obesity; alterations in the second three months may be associated with pulmonary and renal pathologies and, in the final three months diabetes, schizophrenia and personality disorders of the antisocial type. Thus not only is genetics important (to be able to) but also epigenetics (to be). Barker’s considerations concern not only the metabolic syndrome, but also the major neuropsychiatric disorders (depression, ADHD,

schizophrenia, autism) that may have their onset in the mother's womb, as he himself underscored in an interview that appeared in *Time* in October of 2010 [4].

The changes that take place in the organism are far-reaching and oriented so as to lead the fetus to survival (*I was born to be born*, Pablo Neruda would say) but also to reproduce (I was born to reproduce myself). Imbalance in a critical window of development, for example in the second three months of pregnancy, may lead to cell hypodysplasia, a reduction of vascular arborization, reduction of ureteric bud arborization or that of the bronchial tree, which cannot be recovered, except partially, at a later time. In the same way, a *noxa* in the third three months of pregnancy causes an alteration of the cerebral connections. From this comes the possibility, at least potential, of transforming the critical window of vulnerability into one of opportunity to prevent cardiovascular diseases in the child and the adult. The objective is not only to reduce the *noxae* for the fetus, but also to learn how to increase the resilience of the fetus and the neonate.

Barker's thought was evolution and revolution together, altering medical thought in its entirety and forcing us to constantly pose important questions on the gestational age at which to apply neonatal reanimation or not.

Barker's idea has another practical corollary: it is evident that the role of obstetricians, perinatologists and neonatologists is more and more relevant in medicine and future prevention. In all likelihood,

future texts of internal medicine will deal less with traditional diseases (preventable or held to a minimum in the perinatal period) and more with clinical pictures not previously described (such as, for example, the metabolic syndrome itself).

Unquestionably, besides the enormous merits of his clinical research, among the benefits that Barker has contributed there is that of having helped us to see things from new points of view. Not only is the neonate (and even more so the fetus) not an adult of reduced proportions, but perhaps the neonate is the "father" of the adult person [5]. We must, with great humility, reconsider all that we believed for decades in good faith; it is no accident that Eliot sums up his deep reflection in the following way: *in my beginning is my end*.

References

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