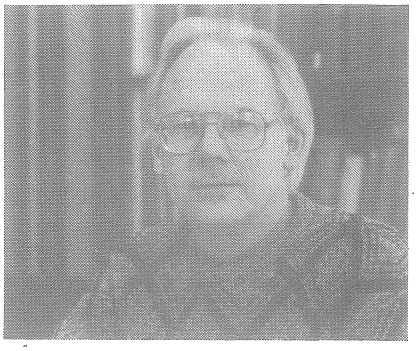
Before I was an embryo, I was a preembryo: or was I?



D Gareth Jones
Professor of Anatomy and Structural Biology, Otago University and Associate Member, Bioethics Research Centre

Issues surrounding the human embryo are poignant and profound. Should research be conducted on them? Should they be discarded? Should they be donated to infertile couples? Surprisingly, such tantalizing conundrums force us to ask how early embryos are best defined. The crucial consideration is how best to describe the first two weeks of development, since traditionally prenatal human development has been divided into the first eight weeks (the embryo) and the remaining 32 weeks (the fetus). However, some argue that there is now need for increasing precision of terminology due, in part, to the many procedures that can be carried out in the laboratory within the first few days of embryonic human life.

The question that has to be faced is whether the biological differences between the first two weeks and the following six weeks are sufficiently great to justify use of different terminology for these two periods within the embryonic phase. But why, it may be asked, should this matter be of concern to anyone other than reproductive biologists? The answer is not difficult to find, and it is that in discussions of the moral value to be placed on the embryo, some consider that the characteristics of the first two weeks are such that little, if any, moral value should be ascribed to this initial period of development. In practice, therefore, there is, in the eyes of some people (by no means all), a close correlation between scientific understanding and moral significance.

The term that has been introduced into the literature to describe these first two weeks of development is *preembryo*, which is generally used to describe the products of conception up to the appearance of the primitive streak at 14 or 15 days after fertilisation. The 14-day point also corresponds to the completion of implantation. From then on, the term embryo (future fetus) is used. This is fine as far as it goes, as long as it is realised that the embryo as future fetus (embryo-fetus) originates as a very small part of the preembryo (being distinguishable as early as 4-5 days after fertilization). Even the preembryo contains hints of the embryo.

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The arguments used to justify this new term revolve around the nature of very early embryonic tissue, twinning (which is normally completed by 14 days), and pregnancy wastage (the very high rates of miscarriages). I shall refer to just the first of these.

The early embryo (preembryo) is regarded as possessing a number of dominant characteristics. The first is that much of it gives rise to the placenta and supporting tissue rather than to the embryo-fetus. Prior to the formation of the primitive streak (at 14 days), what exists is a collection of two cell groups, one of which (the inner cell mass) contributes towards the subsequent development of the embryo-fetus, while the other (the trophectoderm) develops into extra-embryonic structures, including the placenta. In view of this, some place great emphasis on the primitive streak, which they regard as occupying a position of strategic significance. It marks the transition from an unordered preembryo to an ordered embryo, and also the commencement of human individual existence. A further characteristic of the early embryo is that it is neither a coherent nor a spatially defined entity, while its early developmental potential is unrestricted. What are we to make of these arguments?

First, the argument relating to the *placenta*. At birth, the placenta will be discarded, at which time it is given no value in most societies. Does this mean that the early embryo itself is of no value (since the bulk of it develops into the placenta)?

The role of the placenta is an extraembryonic organ of exchange of nutrients and wastes between the mother and embryo. As such, it may be compared with an artificial respirator. Both are vital for the survival of the individual using them, and neither is within the body of the one they support. Neither is thought of as *being* that individual. If a person supported by a respirator dies, that person rather than the respirator is mourned. However, in terms of status, the individual's dependence upon an organ such as the placenta or respirator (an artificial organ) leads to conferment of that individual's worth upon the organ *for as long as it is required for its particular function*. Consequently, the placenta cannot be dismissed as equivalent to any other human tissue. Destruction of the placenta is equivalent to destruction of a fetus; just as destruction of the heart is equivalent to destruction of an individual.

Consequently, during early development, the trophectoderm is essential for the early embryo's interaction with the uterine environment. Since this interaction is essential for the survival of the inner cell mass, the trophectoderm should be valued as the inner cell mass (embryo-fetus) is valued, even though it will never constitute part of the fetus. Hence,

far more ethical weight should be ascribed to the placenta and its forerunners than has been done in some recent discussions on the early embryo.

This is in line with Holland's position, that no matter what a given set of cells such as the trophectoderm *will* be, this is not decisive with regard to the status of those cells *now*.

It can also be argued that, even though much of the early embryo is committed to the formation of extra-embryonic tissues, the whole of it is essential for the well-being, growth and further development of that particular prenatal individual. There can be no future embryo-fetus without the extra-embryonic tissues.

What about a second issue, the contention that the *primitive streak* occupies a position of strategic significance in the transition from an unordered early embryo to an ordered embryo-fetus? Since it occupies a place within a set of developmental events, it is a transitory phenomenon, on its way to being transformed into more definitive features of the developing embryo. It provides an important and orderly controlling step in body patterning; but it is its regression that is one of the key events for the occurrence of subsequent events during embryonic development.

A third characteristic of the early embryo is the unrestricted nature of its developmental potential during the first few days of gestation. This means that the early embryo can be experimentally redirected into chimera formation and inter-species grafting, while genetic or environmental factors can produce disorganised tissue, such as hydatiform moles or even highly invasive tumours. However, the manipulations and aberrations that may occur during early embryonic development are simply indicative of the developmental process. They are not indicative of any non-human nature of the early embryo.

In summary, the recurring motifs of embryonic development are: gradually decreasing potentiality, increasing determination and differentiation, and increasing complexity and interaction. This development occurs smoothly rather than in quantum leaps and its object is the transformation of a single fertilized ovum into a very complex organism. Any attempt to distinguish between clearly-delineated developmental stages, such as preembryo and embryo, has the inherent problems of any developmental continuum. Within a developmental context the commencement of an essentially new level of development in no way denies the developmental significance of that which preceded it. What is significant, both morally and biologically, is the whole, regardless of whether some parts of the whole will or will not continue through into postnatal existence. They are all essential for prenatal existence, without which there would be no postnatal existence.

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It is the whole that is the individual-human-life-to-be. The early embryo is *becoming* an individual in this sense. We are not interested in cells, as such, but in the whole. The pluripotential nature, or otherwise, of cells tells us nothing about how it is right to treat the early embryo. Neither does the first appearance of the primitive streak tell us anything of moral significance. We are more interested in organogenesis (the development of organs), that is, in what lies *beyond* the primitive streak stage. But even this only underlines our emphasis on the human-life-that-is-in-the-making.

This emphasis upon the early embryo (inner cell mass plus extra-embryonic tissues) as a whole, leads me to reject the preembryo terminology. I am not convinced that it helps clarify either the scientific or ethical issues at the beginning of human life. No currently employed terminology can completely avoid confusion, but I would use the terms embryo-fetus and embryo-placenta, to depict those parts of the early embryo that will give rise respectively to the fetus and placenta. This preembryonic-embryonic distinction may have some interest scientifically, and one may wish to make tentative distinctions at various places along a biological continuum. In these terms, the preembryo concept may have merit. However, it gives an impression of precision that is misleading and that fails to grasp the significance of the whole as represented by the interrelationships of the embryo-fetus and embryo-placenta.

Similarly, arguments stressing the scientific significance of the primitive streak are readily transmuted into arguments stressing its moral significance: value is to be assigned to the human embryo as an ontogenetic individual from this point onwards, with little or no value ascribed to preceding stages. In the most extreme cases, the contrast is between absolute value afterwards against no value beforehand. Use of the embryo-fetus and embryo-placenta terminology recognizes the scientific significance of the primitive streak, but also emphasizes the ongoing nature of those developmental events that straddle the 14-15 day mark. This fits more readily with a host of scientific and moral perceptions.