Pregnancy Specific Biological Substances: A Biological Waste? (Volume 1, Issue 2, April-June 2017)

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In ancient mythologies, be they from Greece, India or China, there are stories of kings and emperors seeking the 'fountain of youth' or 'pearls' that would rejuvenate them. The so-called Philosopher's Stone that medieval alchemists searched for fruitlessly, was supposed to not only turn any substance into gold, but also to prolong life and restore youth. Ancient Indian sages practised 'Siddha Vaidya' as well as 'trantric' methods for the same reason. In contemporary times, with a better understanding of the human body down to cellular structures and the DNA along with a better knowledge of debilitating diseases and their impact, scientists are looking not at rejuvenation but regeneration.

A natural effect of aging is degeneration; every organ in a human body degenerates as it ages, leading ultimately to, as they say, death due to old age. Congenital defects and damage can also affect organs like the liver, heart or the kidney, causing loss of function. Diseases like Parkinsonism or diabetes also cause specific organs to dysfunction. Many of these diseases are also associated with aging and in today's world, improved healthcare has resulted in increasing longevity. Many significant human diseases arising from the loss or dysfunction of specific cell types in the body, such as Parkinson's disease, diabetes and cancer, are becoming increasingly common. So far, there had been no reprieve from such debilitating diseases or from damage caused by burns or other accidents. Today, however, a new branch of medicine, Regenerative Medicine, shows much promise.

The term probably comes from a 1992 paper of Leland Kaiser, "The Future of Multihospital Systems", where in a paragraph sub-titled 'Regenerative Medicine', the author noted that a "new branch of medicine will develop that attempts to change the course of chronic disease and in many instances will regenerate tired and failing organ systems" (Kaiser L. Top Health Care Finance, 1992 Summer; 18:4: 32-45). With work on stem cells getting a new boost in recent years, the process of regenerating dysfunctional and aging organs appears to be no longer a myth but a reality.

Regenerative medicine refers to that branch of medicine which deals with living functional tissues that help to repair or replace damaged or aging tissues, thus regenerating the organ concerned. Research in this field includes cell therapy involving stem cells or progenitor cells, induction of regeneration by biologically active molecules, tissue transplantation, tissue engineering and the use of cord blood, to mention a few.

Regenerative therapies have been demonstrated (in trials or in the laboratory) to heal broken bones, burns, blindness, deafness, heart damage, nerve damage, etc. It has the potential to cure diseases through repair or replacement of damaged, failing or aged tissue. Therapies include regeneration of tissues in vitro for future use in vivo as well as direct placement and regeneration of tissue in vivo. However, this are of medicine is still in its infancy despite the strides made in the last decade. Much of the work is still confined to animal or laboratory models. The next few years are critical as more and more human trials are undertaken and the true potential of this emerging branch of medicine is expressed.

The present topic has broadened the focus to include a variety of pregnancy induced biological substances that have the potential in healing and regeneration, for instance, the stem cell-rich amniotic fluid, the cytokine rich placenta and its stem cells, the chorionic and amniotic membrane and the veins of the placental cord. These items which are discarded after birth have been found to have regenerative potential in many diseases and damages to tissues and organs. Scientists from all over the world are researching on pregnancy specific biological substances on the simple logic that these are the substances which help a zygote to become a full-grown neonate capable of independent survival after birth. It promises to be an eye-opener to the enormous potential of hitherto discarded material that had been so far considered as a pure biological waste. The book will have served its purpose if it acts as a stimulant to professionals and clinical scientists who can build on the knowledge and expand the curative potential of pregnancy-specific biological substances.