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Editorial

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Potential Therapy of HIV/AIDS and Ebola Outbreak with Pregnancy Hormone, Human Chorionic Gonadotropin

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HIV is a retrovirus that destroys hosts' immune system. AIDS is a late stage HIV infection. About 35 million people are living worldwide with HIV/AIDS, mostly in sub-Saharan Africa. Although there is no known cure, advances are constantly being made on how to better prevent and/or treat HIV/AIDS patients. Current anti-viral therapies are quite expensive, have side effects and do not work for everyone. Thus, there is a substantial unmet need for cost effective treatments, particularly in developing countries.

Human Chorionic Gonadotropin (hCG) is a hallmark hormone of pregnancy. Its levels rapidly increase during the first trimester, reaching a peak by about the 9th week followed by a rapid decline to about one-tenth of the peak levels. Contrary to the previously held belief, hCG has many more roles other than rescuing corpus luteum during early pregnancy. These actions in toto are considered to favor pregnancy initiation, maintenance and then facilitating labor progression at the end of pregnancy. hCG along with its structural and functional homolog, Luteinizing Hormone (LH), can regulate many non gonadal tissues in both genders.[1]

Some obstetricians empirically believed that hCG has antiviral properties, but there is no definitive scientific evidence.The notion that hCG may have an anti-HIV effects come from the findings that babies born to HIV positive mothers are typically infected during vaginal delivery, when baby's mucosal surfaces are covered with virus laden maternal blood and body fluids. This led to American College of Obstetricians and Gynecologists' recommendation to deliver the babies of HIV positive mothers by Caesarian section, following a course of antiviral therapy. There are also notable studies demonstrating that urinary purified hCG suppresses HIV replication, reverse transcriptase, gene transcription and protein synthesis. Since urine derived hCG is not 100% pure, it is naturally questionable whether the effects are truly attributable to hCG or to contaminants present in the hCG preparations. However, the intrinsic anti-HIV effect of hCG was confirmed by recombinant hCG, which is 100% pure, can inhibit HIV transmission from virus positive lymphocytes to virus negative trophoblasts. However, recombinant hormone was less effective than urinary purified hCG, which suggests that some unidentified contaminant might act synergistically with hCG.[2]

Fetus seems to be protected from maternal HIV in utero, but what it is that is protecting is unknown and is difficult to investigate in pregnant women. Pregnancy is a complex physiological state in which many hormones fluctuate in a temporal specific manner. To identify the protective factor(s), transgenic HIV mouse model had been developed. In this model, hCG has been shown to have a protective effect. This effect is mimicked by LH, but not by follicle stimulating hormone, thyroid stimulating hormone, prolactin, estradiol or progesterone. Although there are no in depth studies to precisely determine how hCG acts, preliminary data indicates that it works in part by decreasing serum TNF- α levels. The other unexplored mechanisms include, activation of cells of immune system, altered of secretion of other cytokines and chemokines, interference with viral entry into cells, their replication, infectivity and so forth.

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These findings suggest that hCG could be placed in a mix of treatment options for HIV/AIDS. hCG is non-toxic and has relatively few, if any, harmful side effects. hCG is already used for other clinical indications. It is quite inexpensive, compared with anti-viral drugs. Finally, affordable therapies can advance the efforts to control the spread of HIV/AIDS in sub-Saharan African countries and elsewhere. So what do we have to lose by simply trying hCG for the prevention and/or treatment of HIV/AIDS?

Like HIV, Ebola is also a RNA virus. Ebola is transmitted like HIV but it is much more contagious. Both are killers, while Ebola is a direct killer by destroying every cell it comes in contact with, HIV kills indirectly by disabling the host immune system which allows other pathogens to invade and kill. While HIV and Ebola are clearly very different viruses, they probably employ similar strategies to enter host cells by using their surface glycoproteins and host cell surface receptors and subsequently use the host cells machinery to make viral proteins that help them proliferate, spread and evade host immune system. Many of these molecular details are known for HIV and they are mostly unknown for Ebola. Ebola outbreak is devastating the West African countries of Guinea, Liberia and Sierra Leone and threatens other countries. Intensive supportive therapy and blood transfusions from Ebola survivors are the current best options for treating infected individuals. There may not be any other new definitive treatments in the near future. If hCG has anti-viral effect on one RNA virus, it may also have a similar effect on another RNA virus. Although this is highly speculative, but it may not be too far-fetched. The world is desperate for anything that might contain the Ebola outbreak before it makes a big leap from West Africa to other parts of the world. Therefore, it might be worth considering hCG in a rapid clinical trial in Ebola infected patients. Synthesis of recombinant hCG or making urine purified hCG could be rapidly scaled up to meet the world's demand, if proven effective. In light of the dire circumstances, there is little to lose and perhaps much to gain.

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