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# Influenza (H1N1) Vaccination in Pregnancy



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## Abstract

The extremely pathogenic influenza virus is one of candidates for potential future pandemic in worldwide. Pregnant women are a serious risk for influenza concomitant complaint and death. Vaccination can prevent influenza infection and related complications during pregnancy and newborn respiratory problems.

**Keywords:** Influenza; Placental transmission; Vaccination; Pregnancy

## Introduction

The influenza virus is a highly infectious agent that is a member of the RNA virus family, and Influenza A and B can cause increased morbidity and mortality in pregnancy [1]. The influenza viruses were reported in conjunction with adverse pregnancy outcomes, such as maternal and fetal death, preterm birth, and miscarriage in pregnant women, during the pandemics of 1918, 1957 and 2009 [2-4]. Influenza pandemics threaten humanity. In 2009, the H1N1 threat was a mixture of human, avian, and swine strains that arose in Mexico [5]. Though it was easily transmitted, the rate of mortality and morbidity was low. Every year, 36,000 people in the United States die from seasonal flus. Previous studies have reported that the maternal death rate is 4-11% during pregnancy [6,7].

## Discussion

The high influenza risk faced by pregnant women poses a major public health problem. Fetal dissemination of any infectious agent generally requires placental transmission. [8,9] The placenta is attached to the uterine decidua, a specialized tissue containing decidual cells, placental-derived extravillous trophoblasts (EVTs), and maternal immune cells. Although influenza viruses primarily attack respiratory tract cells, H1N1 has been isolated in the placental unit on rare occasions. [10,11] Influenza viruses have also been found to be trans-placental transmitted, which causes miscarriage and preterm delivery. [11] It has been previously reported that influenza virus infection provokes apoptosis and the production of interleukin 6 tumor necrosis factor and interferon-beta in human fetal membrane chorion trophoblastic cells [11,12]. The induction of pro-inflammatory cytokine and apoptosis in placental trophoblastic

cells may have a possible role in the etiology of intrauterine fetal complication. Moreover, previous studies have demonstrated that influenza virus infections induced MMP-9 gene expression in human placental cells [13].

It is unclear how the virus gains access to the placenta to promote maternal-fetal transmission since the placental cells in contact with maternal blood, syncytiotrophoblasts, are non-permissive [14]. Placental anchoring villi attach to the uterine decidua. Like the placenta, the decidua, which contains a mixture of maternal and fetal cells, is an immune-privileged site. The virus is also associated with miscarriage, stillbirth and fetal growth restriction, suggesting a placental pathology [15]. The absence of biologically comparable, inexpensive and readily available animal models has stymied the study of maternal-to-fetal transmission. The placenta contains decidualized endometrial stromal and glandular cells, placenta-derived EVT, blood vessels and various maternal immune cells, including uNK cells, macrophages, dendritic cells and lymphocytes, all of which are involved in anti-viral responses. The decidua is the only site of direct interaction between the maternal uterine cells and placental cells. The latter consists of anchoring villous-derived cytotrophoblasts. Women with influenza during pregnancy are more likely to have adverse neonatal outcomes, such as the newborn being small for its gestational age [15]. The host's immunological defense against viral infections involves a combined innate and adaptive immunity. Pregnant women with risk factors such as immune suppression, asthma and obesity are highly susceptible to potential complications. An influenza vaccination in pregnancy is safe for both pregnant women and their fetus. Vaccinations are already preventing millions of

maternal and fetal deaths [16,17]. The principal challenge related to influenza viruses is that they are always changing. When they mutate, they change their shape, and the antibodies are no longer effective, which is why there is a different strain every year. Many health providers advise pregnant women to receive an influenza vaccination during pregnancy and should recommend that pregnant women be vaccinated against influenza, particularly during epidemics in winter time [17-19]. Two types of influenza vaccines are currently available worldwide. The inactivated and live-attenuated influenza vaccines are equally effective, but the live-attenuated influenza vaccine should not be administered during pregnancy. The World Health Organization (WHO) vaccine advisors today recommend varying only the 2009 H1N1 element in the Southern Hemisphere's 2017 flu vaccine, the first change in the H1N1 portion since the 2009 pandemic virus established a common seasonal flu strain. This vaccination is safe, inexpensive and beneficial to both the pregnant mother and the newborn [19] Previous studies have demonstrated that there is no increased risk for unfavorable gestation outcomes and the infant's health subsequent to influenza vaccination [20]. Despite the safety data and the value of the influenza vaccination during pregnancy, influenza vaccination rates remain low for pregnant women [21]. The theoretical risk of supposed harm from the vaccine to the fetus is considered to be one of the chief reasons [22].

### Conclusion

Influenza infection is a serious health problem for vulnerable populations. Vaccination can prevent influenza infection and related complications during pregnancy and newborn respiratory problems.

### Conflict of Interest

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### References

- Zhang C, Wang X, Liu D, Zhang L, Sun X (2017) A systematic review and meta-analysis of fetal outcomes following the administration of influenza A/H1N1 vaccination during pregnancy. *Int J Gynaecol Obstet*.
- Lo CY, Strobl SL, Dunham K, Wang W, Stewart L, et al. (2017) Surveillance Study of Influenza Occurrence and Immunity in a Wisconsin Cohort During the 2009 Pandemic. *Open Forum Infect Dis* 4(2): ofx023.
- Henderson DA, Courtney B, Inglesby TV, Toner E, Nuzzo JB (2009) Public health and medical responses to the 1957-58 influenza pandemic. *Biosecur Bioterror* 7(3): 265-273.
- Perrone LA, Tumpey TM (2007) Reconstruction of the 1918 pandemic influenza virus: how revealing the molecular secrets of the virus responsible for the worst pandemic in recorded history can guide our response to future influenza pandemics. *Infectious Disorders-Drug Targets* 7: 294-303.
- Ortiz JR, Lafond KE, Wong TA, Uyeki TM (2012) Pandemic influenza in Africa, lessons learned from 1968: a systematic review of the literature. *Influenza Other Respir Viruses* 6(1): 11-24.
- Katz MA, Gessner BD, Johnson J, Skidmore B, Knight M, et al. (2017) Erratum to: Incidence of influenza virus infection among pregnant women: a systematic review. *BMC Pregnancy Childbirth*, 17: 192.
- Katz MA, Gessner BD, Johnson J, Skidmore B, Knight M, et al. (2017) Incidence of influenza virus infection among pregnant women: a systematic review. *BMC Pregnancy Childbirth* 17(1): 155.
- Lili Xu, Linlin Bao, Wei Deng, Qin Chuan (2011) Highly pathogenic avian influenza H5N1 virus could partly be evacuated by pregnant BALB/c mouse during abortion or preterm delivery. *Virology Journal* 8: 342.
- Ramphal R, Donnelly WH, Small PA (1980) Fatal influenzal pneumonia in pregnancy: Failure to demonstrate transplacental transmission of influenza virus. *Am J Obstet Gynecol* 138(3): 347-348.
- Cetinkaya M, Ozkan H, Celebi S, Koksall N, Hacimustafaoglu M (2011) Human 2009 influenza A (H1N1) virus infection in a premature infant born to an H1N1-infected mother: placental transmission? *Turk J Pediatr* 53(4): 441-444.
- Uchide N, Ohyama K, Bessho T, Yuan B, Yamakawa T (2002) Apoptosis in cultured human fetal membrane cells infected with influenza virus. *Biol Pharm Bull* 25(1): 109-114.
- Ewy GA (1988) The abdominojugular test: technique and hemodynamic correlates. *Ann Intern Med* 109(6): 456-460.
- Uchide N, Obatake K, Yamada R, Sadanari H, Matsubara K (2016) Regulation of Matrix Metalloproteinases-2 and -9 Gene Expression in Cultured Human Fetal Membrane Cells by Influenza Virus Infection. *Biol Pharm Bull* 39: 1912-1921.
- Tarbaeva DA, Kostinov MP, Iozefson SA, Zagorodnyaya ED (2011) Clinical course and outcomes of influenza A (H1N1) 2009 in pregnant women. *Zh Mikrobiol Epidemiol Immunobiol* 4: 71-76.
- Mendez-Figueroa H, Raker C, Anderson BL (2011) Neonatal characteristics and outcomes of pregnancies complicated by influenza infection during the 2009 pandemic. *Am J Obstet Gynecol* 204(6 Suppl 1): S58-S63.
- Principi N, Esposito S (2017) Influenza vaccine use to protect healthy children: A debated topic. *Vaccine* S0264-410X(17)31232-X.
- Christian LM, Beverly C, Mitchell AM, Karlsson E, Porter K, et al (2017). Effects of prior influenza virus vaccination on maternal antibody responses: Implications for achieving protection in the newborns. *Vaccine* 35(39): 5283-5290.
- Engels G, Hierweger AM, Hoffmann J, Thieme R, Thiele S, et al. (2017) Pregnancy-Related Immune Adaptation Promotes Emergence of Highly Virulent H1N1 Influenza Virus Strains in Allogeneically Pregnant Mice. *Cell Host Microbe* 21(3): 321-333.
- Benowitz I, Esposito DB, Gracey KD, Shapiro ED, Vazquez M (2010) Influenza vaccine given to pregnant women reduces hospitalization due to influenza in their infants. *Clin Infect Dis* 51(12): 1355-1361.
- van der Maas N, Dijks-Elsinga J, Kemmeren J, van Lier A, Knol M, et al. (2015) Safety of vaccination against influenza A (H1N1) during pregnancy in the Netherlands: results on pregnancy outcomes and infant's health: cross-sectional linkage study. *BJOG* 123: 709-717.
- Lu AB, Halim AA, Dendle C, Kotsanas D, Giles ML, et al. (2012) Influenza vaccination uptake amongst pregnant women and maternal care providers is suboptimal. *Vaccine* 30(27): 4055-4059.
- Drees M, Johnson O, Wong E, Stewart A, Ferisin S, et al. (2012) Acceptance of 2009 H1N1 influenza vaccine among pregnant women in Delaware. *Am J Perinatol* 29(4): 289-294.



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