



and an expanding antiretroviral treatment program since 2002. Both programs are free to patients. All pregnant women can receive HIV counseling and testing. Antiretroviral prophylaxis for women and infants and infant formula are provided for HIV-positive women. Although 95% of pregnant women attend antenatal clinics and deliver in health facilities, uptake of PMTCT has been low. A CDC-Botswana government survey of pregnant women was performed to explore factors influencing HIV test acceptance. Factors predicting acceptance included higher educational level, attendance at urban clinics, greater knowledge about PMTCT, planned pregnancy, discussing HIV testing with others, and knowing others who had received PMTCT or antiretroviral therapy.

These presentations highlight the successes of PMTCT programs as well as continuing challenges. There continues to be a need for program evaluation, operational research, and expanded PMTCT services in order to maximally prevent mother-to-child HIV transmission.

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Infectious Etiologies of Chronic Diseases: Focus on Women

Infections can directly or indirectly cause chronic conditions through progressive pathology (e.g., chronic infection, inflammation, immunity, malignant transformation), sudden permanent insults (e.g., West Nile virus poliomyelitis paralysis), or by predisposing people to non-infectious sequelae (e.g., neurologic consequences of preterm birth). Bacteria, parasites, prions, viruses, and fungi may be the single or one of several factors contributing to chronic disease; one organism can cause more than one syndrome, and diverse pathogens produce similar syndromes as pathways to disease converge (1). Certain potential outcomes disproportionately affect women (e.g., autoimmune diseases), and in some settings, detection,

prevention, or treatment efforts (e.g., ocular trachoma, underdiagnosed genital infections) may marginalize women. Women's activities can also increase exposures to chronic disease pathogens (e.g., schistosomiasis attributable to chores or agriculture), and gender can affect transmission (e.g., increased male-to-female transmission of human T-cell leukemia virus-1). Preventing maternal infections may further minimize chronic disease and neurodevelopmental disorders in offspring.

Are Women's Autoimmune Diseases Really Autoimmune?

Systemic and organ-specific autoimmune diseases, such as rheumatoid arthritis and myocarditis, are the leading cause of death in women >65 years of age (2). They affect 14–22 million people (5%–8% of the population) in the United States (3) and millions more worldwide. In autoimmunity, the immune system may attack or damage self-tissues with autoantibodies and autoreactive T and B cells. However, the indolent nature of most autoimmune diseases makes determining infectious triggers difficult. Animal models help to understand such links. For example, transfer of disease by autoantibodies and immune cells from affected animals indicates the immune-mediated nature of these syndromes (4–6). Toll-like receptors and the innate immune system, critical components of the normal human response to infection, are essential to naturally and experimentally induced autoimmunity. Genetic and other factors affect susceptibility to both infection and autoimmune disease. For example, coxsackievirus B3 induces viral myocarditis in susceptible mice. Certain cytokines (interleukin [IL]-1 and tumor necrosis factor [TNF]- α), but not viral replication, correlate with cardiac inflammation and can overcome resistance to chronic myocarditis (7–9). These findings suggest that, while infection may trigger autoimmunity, immune processes drive disease progression. Estrogen amplifies the immune response to coxsackievirus B3 in susceptible mice, increasing TNF- α and IL-4 levels (unpub. data), which is perhaps consistent with women's predisposition to autoimmune disease. Identifying triggers, including infection, and early markers of autoimmunity are important goals for preventing onset of or disrupting progression to autoimmune disease.

Infection Connection in Neurodevelopmental Disorders

Intrauterine infections are known causes of congenital defects worldwide. Infections during the time of fetal brain development might also contribute to neuropsychiatric disorders, including schizophrenia. Studies linking various gestational insults (including infections) and subtle pre-morbid behavioral alterations to adult schizophrenia implicate a neurodevelopmental origin. However, the long

latency between putative infection or insult and the emergence of psychotic symptoms complicates establishing direct links. While most reports have been ecologic studies without confirmed maternal infection, Brown et al. (10) found that 20.4% of persons with a documented in utero exposure to rubella developed an adult schizophrenia spectrum disorder. Experimentally, lymphocytic choriomeningitis virus infection in a neonatal rat model produces some latent changes similar to those of schizophrenia, e.g., hippocampal atrophy and impaired inhibitory GABA neurotransmission (11); blocking IL-1 partially attenuates the hippocampal cell loss. Inflammatory cytokine responses, perhaps amplified by immunogenetic abnormalities, may be a common thread linking intrapartum infections and noninfectious gestational and obstetric complications to neurodevelopmental disorders (12).

Keys to the Future

A continuum from acute infection to chronic disease exists, and each stage is an opportunity to prevent or minimize an avoidable fraction of chronic disease— that resulting from infectious disease. Crucial steps include identifying infectious etiologies and cofactors, determining persons (including women) at risk for infection or outcome, and implementing measures that minimize chronic sequelae. Research incorporating longitudinal studies that precede clinical disease must support evidenced-based conclusions and actions. The benefits to women could be substantial.

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Disproportionate Impact of Sexually Transmitted Diseases on Women

Worldwide, sexually transmitted diseases (STDs) and HIV affect women more than men. This gender differential is greater in developing countries than in industrialized countries, and biological, social, cultural, and economic factors all contribute to the gender differential in STD/HIV. Larger mucosal surface area, microlesions caused during sex (particularly forced sex), and the presence of more HIV in semen than in vaginal secretions all contribute to women's greater vulnerability to STDs and HIV.

Their sex partners' behaviors also put women at risk for STDs and HIV. Culturally, men are expected to have multiple sex partners, including sex workers, and women may risk abuse or suspicion of infidelity if they refuse sex or request protection. Financial and material dependence on men renders women economically more vulnerable to STDs and HIV. Often women are under pressure to find a husband or bring home money, which in the absence of viable alternatives leads them into sex work. Effective prevention of STDs and HIV necessitates large-scale social,