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Counseling Points™

Enhancing Patient Communication for the MS Nurse

The Role of Gender in MS:

The Influence of Sex Hormones, Disease Type, and Other Factors

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Counseling Points™

The Role of Gender in MS: The Influence of Sex Hormones, Disease Type, and Other Factors

Continuing Education Information

Target Audience

This educational activity is designed to meet the needs of nurses who treat or who have an interest in patients with multiple sclerosis (MS).

Purpose

To provide nurses with up-to-date information on the role of gender in MS.

Learning Objectives

Upon completion of this educational activity, the participant should be able to:

- Review gender influences on the disease course in MS
- Describe the impact of male and female sex hormones on MS
- Explain the effects of pregnancy and breastfeeding on the MS disease course
- Counsel male and female patients about fertility and the potential effects of treatments

Continuing Education Credit

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In order to earn credit, please read the entire activity and complete the post-test and evaluation at the end. Approximate time to complete this activity is 60 minutes.

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welcome

Dear Colleague,

Although it is widely accepted today that multiple sclerosis (MS) affects women more often than men, the disease was first believed to predominate in men. This was largely due to societal influences, where men's MS-related symptoms were taken more seriously, whereas women's symptoms were often dismissed as emotional, stress-related, or hysterical in nature. The recommended treatment for such hysteria was frequently hysterectomy.

Today, thankfully, we have a greater understanding of MS and its impact on both men and women. We know that there are many gender disparities in disease presentation and progression. Indeed, men and women may be experiencing different courses of MS—women most often have relapsing forms of MS and men have progressive forms.

Many of the disparities between men and women may be attributable to hormonal differences: High levels of circulating estrogen and progesterone protect women during pregnancy from relapses, and relapse patterns often follow the menstrual cycle. Testosterone appears to be protective in men, evidenced by the uptick in diagnoses among men in their 30s and 40s, when testosterone levels naturally decline in men.

For this issue of *MS Counseling Points™*, we have asked a panel of MS nurse specialists to discuss the many issues related to gender in MS and to offer practical advice on counseling patients about fertility, pregnancy, breastfeeding, and sexuality. While there is still much to learn about how gender impacts MS and its treatment, I hope readers will gain valuable skills and insights from this continuing education program.

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The Role of Gender in MS: The Influence of Sex Hormones, Disease Type, and Other Factors

One of the best-studied neurological diseases epidemiologically, multiple sclerosis (MS) was considered a male disease at the start of the 20th century.[1] This was largely due to societal influences, where men, as the family breadwinners, were more likely to be diagnosed with the chronic disease if they exhibited symptoms. In contrast, women's MS-related symptoms were likely to be dismissed as emotional, stress-related, or hysterical in nature.[1]

MS diagnosis shifted toward women in the 1960s and 1970s, with a ratio of approximately 4:1.[2] Today, it is typically suggested that the disease occurs two to three times as often in women as in men, although the ratio varies by region.[3]

In an oft-cited 2006 longitudinal study conducted in Canada, sex ratios for MS were calculated by birth year from 1931 to 1980, showing an increase in the female-to-male sex ratio over at least 50 years.[3] Of 27,074 patients, 19,417 cases were in women and 7,657 were in men for a ratio of 3.2:1. A recent meta-analysis of the worldwide data also showed an increase in the incidence of relapsing-remitting MS (RRMS) in women.[1] This increase may be due to earlier diagnosis, obesity, lifestyle habits such as smoking, or environmental influences such as decreased sun exposure and vitamin insufficiency, rather than to an actual increase in the propensity to develop MS.[3-5] The incidence of primary-progressive MS (PPMS) has not increased in women over the past few decades.[1,4]

A number of gender-related differences have been identified between men and women with MS **(Table 1).** In pediatric populations, there is a 1:1 ratio before age 12; from puberty onward, girls are more often affected than boys.[6,7] During the adult years, although women are affected more often and at younger ages, they don't tend to have a worse prognosis than men and they tend to have a slower disease course. This may be due to the fact that they are typically diagnosed with RRMS rather than PPMS. They also may have a greater innate ability to repair injury than do males.[5] Men, in contrast, are more commonly diagnosed with PPMS and progress rapidly to disability. Men have more spinal cord disease, whereas women have more brain disease.[8,9]

Hormonal Influences

High levels of both male and female sex hormones appear to have beneficial effects on the central nervous system in patients with MS, perhaps by inducing a shift from a Th1 (pro-inflammatory) to a Th2 (anti-inflammatory) immunological response.[10,11]

Testosterone appears to be protective against the disease in men; indeed, bioavailable testosterone begins to decline in men around the typical age of onset in the 30s to 40s.[12] In kind, estrogen and progesterone appear to exert both anti-inflammatory and neuroprotective effects in women, providing protection against oxidative stress and neurotoxic compounds.[5,9]

Table 1. Gender Differences in MS Diagnosis and Disease Course[3,5,8,9,11,14,21,26,27,33]

	Women	Men
Ratio for RRMS	2-3	1
Ratio for PPMS	1	1
Age of onset	Young adult (20s-40s)	Middle age (30s-40s)
Disease type	More RRMS	More PPMS
Disease course	Slower disease course with typical younger age of onset and often a better prognosis than men. Perimenopausal onset, in contrast, is often associated with a progressive form of the disease	Faster, more aggressive disease course—perhaps because men are often diagnosed with PPMS rather than RRMS
MRI findings	Women have more brain disease and more inflammation	Men have more spinal cord disease and more T1 black holes
Immune response	Women tend to have a more robust immune response than men, suggesting a resilience mechanism	Men have less of a response to immune challenges
Hormonal influences	Estrogen and progesterone appear to be protective against the disease in women; pregnancy and breastfeeding confer temporary protective effects on MS disease activity	Testosterone appears to be protective against the disease in men
Genetic influences	Women with MS are more likely to carry the HLA-DRB1 gene than males	Unaffected fathers are less likely than unaffected mothers to transmit MS susceptibility to children
Cognitive differences	Women perform better than men on cognitive tests	Men appear to have less-efficient and less-resilient brain function than women
Sexual functioning	40%-80% of women with MS complain of symptoms such as decreased libido, decreased sensation, orgasmic dysfunction, decreased vaginal lubrication, and pain with intercourse	50%-90% of men with MS complain of symptoms such as decreased libido, erectile dysfunction, decreased orgasms, ejaculatory dysfunction, decreased sensation, and fatigue

MRI=magnetic resonance imaging; PPMS=primary-progressive multiple sclerosis; RRMS=relapsing-remitting multiple sclerosis.

Historically, pregnancy was thought to be a cause of MS in women and surgical sterilization was recommended. The most definitive study on the topic, The Pregnancy in Multiple Sclerosis (PRIMS) trial, was published in 1998 and reversed that thinking, showing that pregnancy actually confers protection against MS.[13] This is presumably due to a surfeit of circulating estrogen and progesterone.[5] During PRIMS, European investigators followed 254 women with MS over the course of 269 pregnancies and for up to 12 months after delivery.[13] The rate of relapse declined during pregnancy, particularly in the third trimester. It then increased over the first 3 postpartum months before returning to the pre-pregnancy rate of relapse. The PRIMS investigators also found no contraindications to spinal anesthesia or breastfeeding for women with MS.[13,14]

Voskuhl and colleagues have been studying the effects of the pregnancy hormone estriol as a treatment for MS. A pilot study showed protection comparable to pregnancy in patients with RRMS, and they are now conducting a 2-year, controlled clinical trial of estriol as an adjunct to glatiramer acetate (GA) versus placebo plus GA in 130 women with RRMS.[3] Another trial being conducted in Europe is looking at the effects of estrogen and progestin to prevent postpartum

relapses in MS.[14] Testosterone treatment is also being investigated in the male MS population.[12,15]

Use of hormonal birth control methods does not appear to increase susceptibility to MS, may have a positive impact on disability level, and may reduce the risk of symptoms.[14] In a retrospective European study, investigators studied a group of 132 women with RRMS who were not receiving disease-modifying therapies (DMTs). Women were grouped as never-users of oral contraceptives (OCs), past-users (meaning they stopped using OCs before the onset of MS), or after-users (meaning they used OCs after the onset of MS). After-users had better Expanded Disability Status Scale (EDSS) and Multiple Sclerosis Severity Score (MSSS) scores compared with never-users and past-users and tended to have a more benign disease course.[16] Another small prospective study of 23 women conducted in Sweden found that women taking OCs had an increase in symptoms during the pill-free interval compared with the weeks they were taking the pill daily. Interestingly, women who were not taking OCs had no changes in symptom scores throughout the menstrual cycle.[17] In another study, the incidence of MS was 40% lower among women who used OCs versus women who did not.[18]

The case may be different with progressive forms of MS. Among women with progressive onset of MS, a study from Belgium found that OC use was actually associated with a greater risk of reaching an EDSS score of 6, suggesting more rapid progression of disease.[19] Those with late onset of menarche had a reduced risk of reaching EDSS 6, suggesting a negative impact of female sex hormones on the progressive form of the disease.

There are few studies examining the effect of menopause on women with MS. It appears that MS symptoms may worsen during this time of life and that hormone therapy (HT), which contains lower doses of estrogen and progestin than hormonal birth control, may or may not reduce them.[5,20] In a Swedish survey, of 72 women with relapsing and progressive forms of MS who were postmenopausal, 24 (39.3%) said their MS symptoms increased during menopause and 5% percent reported symptoms decreased. Twenty-eight women used HT; 26 reported no change in their MS symptoms related to HT and two reported symptomatic improvement.[20]

Genetic Influences and Transmission to Children

The HLA-DRB1 gene has been strongly linked to MS, and women with MS are more likely than men to carry the gene.[21,22] A comprehensive chromosomal study seeking to find genes on the X chromosome that might explain the preponderance of MS seen in females ruled out independent X-linkage, however.[23]

People in the general population have a 1/750 risk of developing MS, while those with MS in the family have a 1/40 risk if a parent, sibling, or child has MS.[24] The closer the relative, the higher the risk due to the more similar genetic identity, and the more people in the family diagnosed with MS, the greater the potential for the individual person to develop it.[11,24] Monozygotic twins have concordance rates of 24%-25% and dizygotic twins of 3%-5%.[11]

MS is not, however, a directly inheritable disease. MS nurses might explain it to patients as a gene-linked disease: If you have MS in the family, similar to having heart disease or diabetes in the family, you are then at higher risk of developing it yourself. However, environmental factors, other genes, and epigenetics impact the risk.

Data from the Canadian Collaborative Project on Genetic Susceptibility to MS (CCPGSMS)

show that affected mothers and fathers are equally likely to transmit the propensity for MS to their offspring.[21] Several other studies, however, suggest that unaffected mothers are at higher risk of transmitting MS susceptibility to children than unaffected fathers, perhaps due to intrauterine exposures, transmission of genotypes, and/or epigenetics.[21]

Age, Progression, and Gender

Gender differences may vary according to the age of onset of MS. In general, men tend to have a more progressive course and greater disability, perhaps, as previously stated, due to being diagnosed at a later age and with PPMS more often than RRMS.[3] Patients who develop MS later in life, whether male or female, are at greater risk for progressive disease, and they are at greater risk for disease that is progressive from the onset of symptoms and diagnosis. The lack of the female sex hormone estrogen in older women, which is protective against MS in younger women, is postulated as one reason for the faster progression.[3]

Brain, MRI, and Cognitive Differences

Men perform worse on cognitive tests than women, and research suggests they have less-efficient and resilient brain functional networks and less ability than females to repair injury to the brain.[25] In a study by Schoonheim and colleagues exploring functional connectivity and network efficiency in male versus female patients with MS using functional magnetic resonance imaging (fMRI), male patients performed less well than female and male control subjects on the Location Learning Test measuring visuospatial memory; female subjects with MS were not impaired.[26]

On MRI, studies have been conflicting, but it appears that men tend to have less inflammatory activity, but develop more spinal cord lesions and T1 black holes than women. Women tend to have higher numbers of gadolinium-enhancing lesions.[8,9]

Sexual Functioning

Both men and women with MS suffer from sexual dysfunction, with studies suggesting it affects anywhere between 40% and 80% of women and 50% and 90% of men.[27] In a 2-year study of 99 patients with MS, researchers found that sexual dysfunction symptoms affected 70%, increased over time, and were strongly associated with bladder dysfunction.[28] Relapses did not appear to increase the number of sex-related symptoms, but nevertheless may exacerbate existing sexual issues.

Table 2 describes common sexual issues for the two genders. The high prevalence of sexual problems makes it critically important that MS nurses ask all patients about their sexuality, especially since many patients will be reticent to bring it up on their own. Questions should be open-ended to discourage "yes" or "no" answers and encourage a dialogue. It's also important to convey the multifaceted nature of sexual dysfunction in MS. It can be related to physiologic issues, such as direct injury to the central nervous system, MS-associated symptoms such as fatigue,

Table 2. Common Symptoms of Sexual Dysfunction by Gender[27]

Females
- Decreased libido
- Decreased sensation
- Orgasmic dysfunction
- Decreased vaginal lubrication
- Pain with intercourse

Males
- Decreased libido
- Erectile dysfunction
- Decreased orgasms
- Ejaculatory dysfunction
- Decreased sensation
- Fatigue

weakness, spasticity, and bladder and bowel concerns, side effects of medications, comorbid conditions such as depression, and cultural and psychosocial issues, such as a negative self-image in regard to physical attractiveness and changing roles due to disease limitations.[27] MS nurses can offer advice and guidance about addressing sexual issues, including recommending ways of redefining intimacy and exploring new ways of being sexual, communication, couples counseling, lubrication products, and medications.[27] The Association of Reproductive Health Professionals has developed a clinical fact sheet entitled "Sex Therapy for Non-Sex Therapists" (available at http://www.arhp.org/Publications-and-Resources/Clinical-Fact-Sheets/SHF-Therapy) and other resources that can assist MS nurses in talking about sexual concerns with their patients.[29]

Domestic Violence in MS

Domestic violence—physical, verbal, emotional, sexual, and financial abuse—affects 1 of 3 women worldwide, according to the latest statistics from the World Health Organization.[30] The problem less commonly affects men.[31] It is also a significant problem for persons with MS and other disabilities, due to their physical vulnerability, cognitive issues, and dependence on others, and can be perpetrated by spouses, parents, children, and other caregivers.[31]

Like sexual issues, domestic violence is often a shameful subject for patients to bring up with providers, so it behooves MS nurses to ask patients if they are being abused by anyone and to look for signs of abuse, such as bruises. This can be difficult to accomplish during a routine office visit, when time constraints require a focus on medications, new symptoms, and other pressing issues. How-

Debunking Myths About MS

Myth: If you have MS, you will have a high-risk pregnancy.
Truth: The research literature shows no increased risk for obstetrical complications among women with MS, although some studies have shown low birth weight among babies born to mothers with active MS symptoms.[32,33]

Myth: If you have MS, you can't breastfeed because you need to get right back on your disease-modifying therapy (DMT).
Truth: Pregnancy often confers a protective effect against relapses for up to 3 months postpartum.[33] There is also data to suggest that breastfeeding is protective, but many women may opt not to breastfeed or to breastfeed part-time due to an increase in MS-related fatigue.[33]

Myth: If you have MS, you don't need to see other health care practitioners besides your MS clinicians.
Truth: Patients with MS have all of the preventive health and chronic disease issues of people without MS and oftentimes more due to their use of medications and lack of mobility. For instance, they may need to undergo bone mineral density testing at a younger age than healthy individuals if they have used steroids to control relapses. MS nurses and doctors should not be the only clinicians these patients see. They need a comprehensive clinical team, and regular cancer, diabetes, thyroid, and other screenings.

Myth: MS is an inherited disease.
Truth: MS is not directly hereditary, but it does run in families. There is a genetic predisposition for it that can be triggered by environmental, epigenetic, and other factors.[21]

Myth: Domestic violence in MS and other settings results from a "loss of control."
Truth: Violent behavior is a choice. Perpetrators use it to control their victims. Domestic violence is about batterers *using* their control, not *losing* their control. Their actions are very deliberate.[31]

ever, **Table 3** suggests questions for assessing for safety in a patient's home.[31]

Effects of Pregnancy and Breastfeeding on MS Disease Course

Several research trials, beginning with the PRIMS study, confirm that pregnancy and breastfeeding confer temporary protective effects on MS disease activity.[33]

Table 3. Screening Questions for Assessing for Domestic Violence[31]

- What is the level of stress in your home?
- Do you have support at home?
- Do you feel safe in your home?
- Are you afraid to go home with your partner or caregiver?
- Has your partner (caregiver) threatened to harm, leave, or institutionalize you?
- Has your partner threatened to harm someone you know?

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A follow-up analysis to the PRIMS study was performed in 227 women with MS for 2 years postpartum to identify clinical predictors of pospartum relapse.[34] The results demonstrated that there are no such predictors, although women who have a lot of disease activity prior to pregnancy are more likely than other patients to have a relapse in the 3 months after delivery. The study also found that the risk of relapse in the second postpartum year mimics that of the prepregnancy year so that over the long term, the increase in risk observed for the 3 to 6 months' postpartum does not translate into worsening disability over time **(Table 4)**.[3,34]

The risk of developing MS or having a relapse does not appear to be associated with the number of pregnancies a woman has, although one study did show a significant cumulative benefit of pregnancy.[14] Women who became pregnant three or more times reduced their risk of a first demyelinating event by 50% and those who had five or more pregnancies reduced their risk to 1/20th of that of women who did not become pregnant.[14,35]

Table 4. Rate of Relapse in the PRIMS Trial and Follow-up[3,34]

Time Period	Mean Rate of Relapse
Year prior to pregnancy	0.6-0.7
First trimester	0.5
Second trimester	0.6
Third trimester	0.2
Three months postpartum	1.2
12 months postpartum	0.6
24 months postpartum	0.5

Most studies of women with MS who breastfeed their infants find that the practice has a protective effect against MS relapses.[33] If a woman chooses to breastfeed, most clinicians do not recommend restarting a DMT due to the risk of transmission of the drug to the infant. Ultimately, as for women without MS, breastfeeding is more of a personal decision than a medical decision—the exception is in women who have a high rate of relapses before and during pregnancy.[36]

Women who choose to breastfeed should be advised that nursing may exacerbate MS fatigue; supplementing with formula so a partner can feed the baby and the woman can rest is good advice for these patients.

Counseling Male and Female Patients about Fertility and the Potential Effects of Treatments

Most patients with MS are as fertile as people in the general population and can be counseled that MS does not affect their ability to become pregnant, to bear and give birth naturally or via Cesarean section, nor is the disease process worsened by MS.[33] The one caveat is if they have used mitoxantrone, which can cause sterility in men and women. Patients should be advised to consult a fertility expert prior to use of this drug if they

wish to conceive in the future, so they can contribute sperm or eggs to be harvested later.[33]

Most of the approved DMTs have a pregnancy rating of C, except for GA, which has a B rating, and teriflunomide, which has an X rating **(Table 5)**.[37] The Food and Drug Administration states that DMTs should not be used by women who are trying to conceive, those who are pregnant, or those who are breastfeeding.[33] Most experts advise stopping a DMT 1 to 3 months prior to trying to conceive. Reproductive-age patients should be counseled to use effective contraception and consult their health care providers before conceiving, and all women of childbearing potential should undergo pregnancy testing prior to initiating a DMT. Women who do become pregnant while using a DMT should be encouraged to contact the manufacturer of the drug they are using to sign up for its pregnancy registry, thus adding to the database on DMTs and pregnancy. DMT use is also not generally recommended when woman are nursing, as it is unclear if DMTs pass into breast milk.[33]

Table 5. FDA Pregnancy Category Ratings for Approved DMTs[37]

DMT	Pregnancy Category Rating
BG-12/Dimethyl fumarate	C
Fingolimod	C
Glatiramer acetate	B
Interferon beta	C
Natalizumab	C
Mitoxantrone	D
Teriflunomide	X

DMTs=disease-modifying therapies; FDA=Food and Drug Administration.
Category A=Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters).
Category B=Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women.
Category C=Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.
Category D=There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.
Category X=Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in the use of the drug in pregnant women clearly outweigh potential benefits.

On a reassuring note, should an unplanned pregnancy occur, several studies support the safety of GA. In a multicenter study performed in Italy, data were collected on 423 women with MS, some of whom became pregnant while using GA or interferon beta (IFNβ).[38] Three hundred and eighteen pregnancies were not exposed to DMTs (meaning they had been discontinued at least 4 weeks prior to conception), 17 were exposed to GA, and 88 were exposed to IFNβ. Compared with the nonexposed and IFNβ-exposed, GA exposure of 4 weeks was not associated with a significantly increased risk of adverse outcomes, including spontaneous abortion, preterm birth, or low birth weight. IFNβ exposure was associated with lower mean birth weight than GA or nonexposure. The authors suggested that based on these findings, GA therapy may be reasonable to consider during pregnancy in women with a high rate of disease activity.

Labeling for the oral drug teriflunomide, which is a category X drug, requires a negative pregnancy test before starting the drug and use of effective contraception while taking it for women of childbearing age.[39] For patients exposed to teriflunomide, an accelerated elimination procedure is recommended prior to attempting to conceive. A study presented at the 2013 American Academy of Neurology meeting, however, showed no defects among 12 babies born to mothers who were using the drug and became pregnant.[40]

There is no good consensus about when to restart DMTs after a pregnancy. If relapses occur during pregnancy, glucocorticoids can be used,

but preferably not in the first trimester. Postpartum intravenous gamma globulin, pulse steroids, and plasma exchange have been used in an attempt to reduce relapses, but with little benefit.[33]

Effect of Fertility Treatments on MS

Women with MS who undergo assisted reproductive treatments are at risk for an increased relapse rate 3 months after treatment associated with clinical worsening and new MRI activity, according to several small studies that have been conducted in France, Germany, and Argentina.[41] This may be due to stopping DMTs while trying to conceive, the stress of undergoing fertility treatments, and hormone-induced immunological changes.[41]

Conclusion

There are a number of significant gender differences in the onset, presentation, and course of MS. While RRMS predominates in women, PPMS is more common in men with later onset. Sex hormones appear to have protective effects against the disease, and pregnancy and breastfeeding confer a temporary reduction in the risk of relapses. The disease is not directly inheritable, but it does run in families. Women with MS are more likely than men to carry the HLA-DRB1 gene that has been linked to MS, and there is some evidence that unaffected fathers are less likely to transmit MS susceptibility to children than unaffected mothers. Men and women both may suffer from sexual dysfunction as a result of MS.

MS nurses can play a significant role in educating patients with MS about these gender issues, and counseling them about fertility, pregnancy, breastfeeding, and sexuality concerns to improve their quality of life.

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Counseling Points™

The Role of Gender in MS: The Influence of Sex Hormones, Disease Type, and Other Factors

- Multiple sclerosis (MS) is among one of the best-studied neurological diseases epidemiologically.
- It was considered a male disease at the turn of the century, but today is recognized to affect two to three times more women than men.
- Testosterone appears to be protective against the disease in men, while estrogen and progesterone appear to exert both anti-inflammatory and neuroprotective effects in women.
- Pregnancy and breastfeeding confer temporary protective effects on MS disease activity.
- Oral contraceptives do not appear to increase susceptibility to MS, and may reduce the risk of symptoms.
- Few studies have examined the impact of menopause on MS. Use of hormone therapy, which contains lower doses of estrogen and progestin than hormonal birth control methods, may or may not reduce MS symptoms.
- Women with MS are more likely to carry the HLA-DRB1 susceptibility gene than males, which has been strongly linked to MS.
- MS is not a directly inheritable disease, but it does run in families.
- In general, men tend to have a more progressive course and greater disability, perhaps because they are more likely to be diagnosed at an older age and with primary-progressive MS rather than relapsing-remitting MS.
- Men perform worse on cognitive tests than women and appear to have less ability to repair brain injury. On MRI, men tend to have less inflammatory activity, but more destructive lesions than women. Women tend to have higher numbers of contrast-enhancing lesions.
- Both men and women with MS commonly suffer from sexual dysfunction. One study found sexual issues were strongly associated with bladder dysfunction.
- Most approved disease-modifying therapies (DMTs) have a pregnancy rating of C, except for glatiramer acetate (GA), which has a B rating, and teriflunomide, which has an X rating. In a multicenter study, exposure to GA was shown not to be associated with a significantly increased risk of adverse effects.
- Most experts do not advise use of DMTs during pregnancy and breastfeeding.

Counseling Points™

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Continuing Education Post-test

To receive contact hours, please read the program in its entirety, answer the following post-test questions, and complete the program evaluation. A certificate will be awarded for a score of 80% (9 correct) or better. A certificate will be mailed within 4 to 6 weeks. There is no charge for the CNE credit.

By Mail: Delaware Media Group, 66 S. Maple Ave., Ridgewood, NJ 07450

By Fax: (201) 612-8282

Via the Web: Applicants can access this program at the International Organization of MS Nurses' website, www.IOMSN.org. Click on *Counseling Points* and follow the instructions to complete the online post-test and application forms.

PLEASE SELECT THE BEST ANSWER

1. A 2006 longitudinal Canadian study found a ratio of _____ to 1 for men to women affected by multiple sclerosis (MS).

A. 2.1
B. 3.2
C. 3.8
D. 4.1

2. An increase in relapsing-remitting MS (RRMS) among women seen in a meta-analysis of world-wide data may be attributable to all BUT which of the following?

A. Vitamin D deficiency
B. Earlier diagnosis
C. Smoking
D. Alcohol abuse

3. The incidence of progressive multiple sclerosis has increased in women over the past few decades.

A. True
B. False

4. On magnetic resonance imaging (MRI), compared with women, men typically have:

A. more spinal cord disease
B. more T1 black holes
C. more brain disease and inflammation
D. both A and B

5. Which of the following hormones appears to be protective against MS?

A. Testosterone
B. Prolactin
C. Cortisol
D. All of the above

6. The definitive study on pregnancy and MS, The Pregnancy in Multiple Sclerosis (PRIMS) trial, found that:

A. the rate of relapse declined during pregnancy
B. the rate of relapse increased during pregnancy
C. pregnancy had a long-term worsening effect on MS relapses
D. pregnancy had no effect on the relapse rate

7. The use of oral contraceptives by women with MS:

A. may reduce MS symptoms
B. has no effect on MS symptoms
C. is contraindicated
D. has not been studied

8. Adult women with MS are more likely to carry the HLA-DRB1 gene than men with MS.

A. True
B. False

9. In a 2-year study of 99 patients with MS, researchers found that sexual dysfunction was strongly associated with:

A. cognitive dysfunction
B. bladder dysfunction
C. domestic violence
D. marital status

10. In one study, women who became pregnant three or more times reduced their risk of a first demyelinating event by:

A. 31%
B. 42%
C. 50%
D. 58%

11. Most experts advise that women who are trying to conceive stop taking their disease-modifying therapy (DMT):

A. 1 month prior to conceiving
B. 3 months prior to conceiving
C. 6 months prior to conceiving
D. never

12. Women with MS who undergo assisted reproductive treatments are at risk for an increased relapse rate 3 months after treatment due to factors such as:

A. the stress of undergoing fertility treatments
B. hormone-induced immunological changes
C. stopping DMTs while trying to conceive
D. all of the above

Counseling Points™: Program Evaluation Form

The Role of Gender in MS: The Influence of Sex Hormones, Disease Type, and Other Factors

Using the scale provided (Strongly Agree = 5 and Strongly Disagree = 1) please complete the program evaluation so that we may continue to provide you with high-quality educational programming. Please fax this form to **(201) 612-8282** or complete it online as instructed below.

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree

At the end of this program, I was able to: *(Please circle the appropriate number on the scale.)*

1) Review gender influences on the disease course in MS 5 4 3 2 1
2) Describe the impact of male and female sex hormones on MS 5 4 3 2 1
3) Explain the effects of pregnancy and breastfeeding on the MS disease course 5 4 3 2 1
4) Counsel male and female patients about fertility and the potential effects of treatments 5 4 3 2 1

To what extent was the content:

5) Well-organized and clearly presented 5 4 3 2 1
6) Current and relevant to your area of professional interest 5 4 3 2 1
7) Free of commercial bias 5 4 3 2 1
8) Clear in providing disclosure information 5 4 3 2 1

General Comments

9) As a result of this continuing education activity (check only one):

❒ I will modify my practice. (If you checked this box, how do you plan to modify your practice?)_____

_____

❒ I will wait for more information before modifying my practice.

❒ The program reinforces my current practice.

10) Please indicate any barriers you perceive in implementing these changes.

❒ Cost
❒ Lack of administrative support
❒ Lack of experience
❒ Lack of opportunity (patients)
❒ Reimbursement/insurance
❒ Lack of time to assess/counsel patients
❒ Patient adherence issues
❒ Lack of professional guidelines
❒ No barriers
❒ Other (please specify)_____

_____

_____

11) Will you attempt to address these barriers in order to implement changes in your knowledge, skills, and/or patients' outcomes?

❒ Yes. How? _____

❒ Not applicable

❒ No. Why not?_____

Suggestions for future topics/additional comments: _____

_____

Follow-up

As part of our continuous quality-improvement effort, we conduct postactivity follow-up surveys to assess the impact of our educational interventions on professional practice. Please check one:

❒ Yes, I would be interested in participating in a follow-up survey.

❒ No, I would not be interested in participating in a follow-up survey.

There is no fee for this educational activity.

Post-test Answer Key	1	2	3	4	5	6	7	8	9	10	11	12

Request for Credit ***(Please print clearly)***

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