

As a woman moves through perimenopause and beyond, she may experience one or more of various menopause-related symptoms and other health effects. This section reviews the most common potential symptoms and effects. Risk factors for common diseases experienced by midlife women (such as osteoporosis, cardiovascular disease, and cancers), as well as strategies to lower risk and treat, are discussed in Section E, page 113.

### Decline in fertility

Fertility declines significantly in women around age 35 to 38, or 10 to 15 years before menopause. In addition, advanced maternal age (age 35 and older) is associated with increased risks for spontaneous miscarriage (50% by age 45), chromosomal abnormalities in the fetus, and other pregnancy complications (eg, premature labor, fetal mortality, or need for cesarean section). Many women in industrialized countries are delaying childbearing and thus may face increased risk of fertility problems.

The functional activity of the ovary changes more with age than does almost any other organ in the human body. With aging, there is a subtle but real increase in follicle-stimulating hormone (FSH) and a decrease in inhibin A and B, which are responsible for the feedback regulation of FSH throughout the menstrual cycle. Declining secretion of inhibin B seems to contribute significantly to the rising FSH levels during the menopause transition and after menopause. The increase in FSH reflects the quality and quantity of aging follicles. Once the oocyte pool decreases to approximately 1,000 follicles, menopause is reached.

In addition to oocyte quality, the primary determinant of reproductive potential, age-related uterine changes may contribute to decreased fertility without creating any major change in the hormonal dynamics of the menstrual cycle.

**Fertility-enhancing options.** Research for assisted reproductive technologies has provided significant information regarding aging and fertility. It is now thought that functional ovarian reserve (as directly measured by a basal day 3 serum FSH and/or other markers) is the most important indicator of age-related infertility. Ovarian reserve describes a woman's reproductive potential as it relates to follicular depletion and oocyte quality. Although some intercycle variability exists, women with elevations of FSH in one cycle usually have elevations in subsequent cycles. Many other markers of ovarian function are currently being evaluated to optimize testing of ovarian reserve.

For women of advanced reproductive age who still desire to have children, fertility-enhancing technologies are an option. Alternatives include in vitro fertilization, intrauterine insemination, oocyte donation, and embryo transfer as well as surrogacy/gestational carriers. Hormonal therapies are also available to promote ovulation.

The success of the fertility-enhancing technology depends on the woman's age, general health, reasons for treatment, and the modality used. Many of these options are expensive, involve some risks, and are not always successful; the success rate decreases closer to menopause. Women of advanced reproductive age often have a number of health risks. In general, fertility-enhancing techniques are discouraged for women older than age 43 and are not recommended after age 51. If a woman is considering these alternatives, she should be fully apprised of the risks and benefits of each technique.

**Birth control options during perimenopause.** Despite a decline in fertility during perimenopause, unplanned pregnancy is still possible until menopause (ie, no menstrual periods for 12 consecutive months) or until levels of FSH are consistently elevated (>30 mIU/mL).

Perimenopausal women have a range of excellent nonhormonal contraception options.

Sterilization (tubal ligation and vasectomy) is safe and effective and has a very low failure rate (about 4-8 per 1,000). The primary disadvantages are the risks associated with anesthesia and the surgical procedure as well as difficulty reversing the process. Sterilization offers no protection from sexually transmitted infections (STIs). Sterilization is a good option for midlife women (or their male partners) if they are in a mutually monogamous, long-term relationship and desire permanent contraception.

Permanent female sterilization is available through hysterectomy, salpingectomy, tubal ligation, tubal fulguration, and application of clips. In addition, noninvasive irreversible sterilization is offered through the Essure Contraceptive Tubal Occlusion Device and Delivery System, available in several countries, including the United States and Canada. Using hysteroscopy in the outpatient setting without anesthesia, a drug-free nitinol-dacron device is inserted into the proximal section of each fallopian tube. When released from the delivery system, the outer coil expands in diameter to anchor the micro-insert in the varied diameters and shapes of the fallopian tube. This spring-like device is intended to provide the necessary anchoring forces for 3 months, during which time the device fibers elicit tissue growth into the coils, contributing to device retention and pregnancy prevention. During this 3-month period, the patient must use an alternate form of contraception. A hysterosalpingogram is performed to determine the proper location of the device and to document tubal occlusion. Studies have found the device to be 99.8% effective after 4 years of follow-up. Performed correctly (following manufacturer's training), the procedure is considered safe, with minimal post-procedure patient discomfort and sequelae and minimal adverse events. The majority of clinical data is based on 12 to 24 months of use; the risks of long-term implantation are not known.