

Clinical Application of a Novel Model to Predict the Individual Age of Menopause

This document outlines the scientific principles and clinical benefits of implementing an absolute risk model for menopause prediction, focusing specifically on early menopause (EM), defined as menopause onset before age 45. By integrating polygenic risk scores (PRS) with environmental factors, this model provides a personalized risk assessment for women. It represents a significant advancement in personalized reproductive health management and proactive decision-making.

The Importance of Predicting Early Menopause

Early menopause has profound implications for fertility and reproductive planning. Women at increased risk of EM often experience reduced fertility earlier than the general population. This necessitates timely interventions such as fertility preservation or family planning adjustments. Early identification of EM risk empowers women to make informed decisions about their reproductive health and manage potential impacts on both their personal and professional lives.

How the Test Works

The model combines genetic and environmental factors to provide a comprehensive assessment. It analyzes over 500,000 genetic variants associated with menopause timing to calculate a polygenic risk score. These genetic insights are then combined with critical environmental factors known to influence menopause onset, such as age, smoking status, age at birth of the first child (if applicable), body mass index (BMI), and contraceptive use. By integrating these genetic and environmental components, the test delivers a personalized and precise estimate of the likely age of menopause, offering women a robust tool for proactive reproductive health management.

Understanding the Test Results

The test report provides three key, ancestry-adjusted values:

- **Relative Risk of Early Menopause:** Indicates how a woman's risk compares to the general population.
- **Absolute Risk of Early Menopause:** Indicates the probability of experiencing early menopause, expressed as a percentage.
- **Predicted Age of Menopause:** Estimates the age range at which menopause is likely to occur.

Potential Clinical Workflow Based on Predicted Menopause Age

This section illustrates how the test results can guide personalized reproductive and lifestyle recommendations. Each category reflects the patient's risk level and predicted menopause timing, providing tailored guidance for fertility preservation, family planning, and overall health management.

Increased Risk of Early Menopause (<45 years)

Women with an increased risk of early menopause should actively consider fertility preservation, such as egg freezing, in their mid-20s to early 30s. Regular ovarian reserve monitoring is highly recommended for those delaying fertility preservation. Lifestyle adjustments, including avoiding smoking and maintaining a balanced diet, can help support reproductive health.

Average Menopause Risk (50–52 years)

For women with an average predicted menopause age, fertility preservation may be considered, particularly if childbearing is delayed. Egg freezing between ages 35–38 could be an option based on ovarian reserve status and personal reproductive goals. Regular ovarian reserve monitoring starting at age 30 is advisable to guide decision-making. Maintaining a healthy lifestyle, including regular exercise and a nutrient-rich diet, supports overall reproductive health.

Low Risk of Early Menopause (>55 years)

Women with a low risk of early menopause are not typically recommended to undergo fertility preservation unless specific circumstances arise, such as personal or professional reasons for delaying childbearing. Egg freezing may be considered in the late 30s or early 40s if ovarian reserve markers remain stable. Maintaining a consistent lifestyle, including regular exercise and stress reduction, supports long-term reproductive health.

Benefits for Patients

By knowing the individual risk, women can make informed reproductive decisions based on their unique risk profiles, empowering them to take control of their fertility. This advancement allows them to make informed choices, giving them greater confidence in decisions regarding fertility preservation, egg freezing, or IVF treatments. It enables them to plan proactively, manage their reproductive timelines more effectively, and align them with personal and professional goals.

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