

Effects of estradiol with and without testosterone on body composition and relationships with lipids in postmenopausal women

Susan R. Davis, MD, PhD,¹ Karen Z. Walker, PhD,² and Boyd J. G. Strauss, MD³

ABSTRACT

Objective: The cardioprotective effects of postmenopausal estrogen replacement therapy are mediated by several mechanisms, including favorable effects on lipids and lipoproteins. The extent to which the latter reflects modification of body fat distribution by sex steroids is not known. Hence, we investigated the relationships between changes in lipids and measures of body composition in postmenopausal women who were administered estrogen therapy with and without testosterone.

Design: We randomized 33 postmenopausal women to treatment with either estradiol 50 mg (E) alone or estradiol 50 mg plus testosterone 50 mg implants (E&T) administered every 3 months for 2 years in conjunction with cyclic oral progestins for women with an intact uterus.

Results: Both therapies were associated with sustained reductions in total cholesterol and low-density lipoprotein (LDL) cholesterol. In women who received E but not E&T, hip ($p < 0.001$) and abdominal circumferences ($p < 0.05$) and fat mass:fat-free mass (FM:FFM) ratio over the abdomen ($p < 0.05$) declined. E&T but not E resulted in increased FFM ($p < 0.001$) and a reduced FM:FFM ratio ($p < 0.05$). For E but not E&T, the decrease in LDL cholesterol was significantly related to changes in total and compartmental body fat and to change in the FM:FFM ratio ($p < 0.05$).

Conclusion: Estrogen replacement has effects on body fat distribution in postmenopausal women that are associated with improved lipid parameters. Addition of parenteral testosterone does not negate the favorable effects of estrogen on LDL cholesterol levels but may attenuate the reduction in centralized body fat achieved with E implants.

Key Words: Testosterone – Estradiol – Menopause – Body composition – Blood lipids.

Coronary heart disease (CHD), the leading cause of death in women in industrialized countries, generally affects women later in life than men. The loss of ovarian estrogen production at menopause is associated with metabolic changes that adversely influence cardiovascular disease risk. Probably the most studied of these is the effect of estrogen deprivation on lipids and lipoproteins. With increasing age in women and possibly as a con-

sequence of menopause, total cholesterol, triacylglycerol (TAG), and low-density lipoprotein (LDL) cholesterol increase and high-density lipoprotein (HDL) cholesterol and its subfraction HDL-2 decrease.¹ Body composition and fat distribution also change in the postmenopausal years such that women tend to lose lean body mass,^{2,3} increase total body fat,³⁻⁵ and develop a more centralized (android) pattern of body fat distribution.^{2,5,6} The more android pattern of fat distribution is associated with higher risk of CHD.^{7,8} It is likely that these changes in body composition and fat distribution are related to the development of a more adverse lipid profile in the postmenopausal years.

Estrogen replacement therapy (ERT), with and without progestin, improves lipid profiles in both normolipemic⁹ and hypercholesterolemic postmenopausal women,^{10,11} and these effects do not seem to be ad-

Received December 28, 1999; revised and accepted April 3, 2000.

From the ¹Department of Epidemiology and Preventive Medicine, Monash University, Prahran, Australia; ²Centre for Population Health and Nutrition, Monash University, Clayton, Australia; and ³Body Composition Laboratory, Monash Medical Centre, Melbourne, Australia.

Address reprint requests to Dr. Susan R. Davis, Director of Research, The Jean Hailes Foundation, 173 Carinish Road, Clayton, Victoria 3168, Australia.