

Estrogen Therapy and Resistance Training

Executive Summary for practitioners

REPORT	Transdermal Estrogen Therapy Improves Gains in Skeletal Muscle Mass After 12 Weeks of Resistance Training in Early Postmenopausal Women
AUTHORS	Dam TV, Dalgaard LB, Ringgaard S, Johansen FT, Bisgaard Bengtsen M, Mose M, Lauritsen KM, Ørtenblad N, Gravholt CH, Hansen M
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DESIGN	Double-blinded randomized controlled trial · 31 early postmenopausal women · 12 weeks

OVERVIEW

This randomized controlled trial tested whether transdermal estrogen therapy amplifies the skeletal muscle response to resistance training in early postmenopausal women. Thirty-one healthy, untrained women within five years of menopause were randomized to a transdermal 17- β estradiol patch or an identical placebo patch, then completed twelve weeks of supervised progressive resistance training three times weekly. The central question: does restoring estrogen change how much muscle the same training program produces? Muscle mass was measured by MRI and DXA rather than estimated, and adherence to all 36 supervised sessions was 100%.

KEY FINDINGS

- Quadriceps cross-sectional area increased **7.9% in the estrogen group versus 3.9% on placebo**, measured by MRI.
- Whole-body fat-free mass rose **5.5% with estrogen versus 2.9% on placebo**, measured by DXA.
- Handgrip strength improved significantly in the estrogen group only, despite a training program focused on the lower body.
- Maximal strength measures and jump performance improved substantially in **both** groups, with no significant difference between them.
- Finger strength and nine-hole peg dexterity improved in the estrogen group but not on placebo, suggesting a possible neuromuscular effect independent of the training stimulus.
- Sit-to-stand performance improved more in the placebo group, which the authors attribute to the technical nature of that test rather than to strength.

CLINICAL IMPLICATIONS

The clinically useful distinction here is between **muscle mass and muscle strength**. Estrogen therapy amplified gains in tissue — cross-sectional area and lean mass — while both groups improved comparably on maximal strength tests. For patients whose concern is sarcopenia, functional reserve, or long-term physical independence, this supports discussing resistance training and hormone therapy as complementary rather than

alternative strategies. It does not support hormone therapy as a substitute for training: every participant trained, and every group gained.

PATIENT IMPACT

Patients often report that the same exercise routine stops delivering results in midlife, and frequently interpret that as a personal failure. This trial gives a physiological frame for that experience and, importantly, a constructive one — the placebo group, all previously untrained, still increased leg strength 34–59% in twelve weeks. The message that lands well in consultation is that training works after menopause, and that hormonal context may change how much it returns.

IMPLEMENTATION CONSIDERATIONS

- **Clinical:** When counseling on muscle loss or functional decline, discuss resistance training as first-line regardless of hormone therapy status.
- **Clinical:** For patients already on transdermal estrogen for symptom control, note that structured resistance training may yield larger body-composition gains than training alone.
- **Practical:** The trial protocol is reproducible — three sessions weekly, six exercises, progressing from 2×15 reps to 4×8 reps over twelve weeks.
- **Communication:** Set expectations around tissue change rather than scale weight; the differences here appeared on imaging, not on a bathroom scale.

LIMITATIONS & CONTEXT

The trial was small (n=31) and lasted twelve weeks, so durability beyond that window is unknown. There were no non-training comparison groups, meaning the study cannot separate the effect of estrogen alone from the combined intervention. Self-reported dietary data was usable for only 11 participants, and reported protein intake sat at the low end of what is recommended to support muscle growth during resistance training — raising the possibility that higher intake would have changed results. Participants were healthy, non-smoking, without cancer history, and within five years of menopause, which limits generalization to later postmenopausal or comorbid populations.

RECOMMENDED NEXT STEPS

1. Identify patients presenting with midlife functional decline who are not currently doing any resistance training.
2. Add a brief resistance-training question to intake for perimenopausal and postmenopausal patients.
3. Where hormone therapy is already indicated for symptoms, incorporate body composition into the goals discussion.
4. Revisit protein intake in patients undertaking new resistance training programs.

RESEARCH SOURCE CITATION

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