

# Nanomedicine Approaches for Treatment of Menopausal Symptoms

Fatemeh Abdi<sup>1</sup>, Fahimeh Ramezani Tehrani<sup>2</sup>, Hamid Mobedi<sup>3</sup>, Mahrokh Dolatian<sup>4</sup>, Nariman Mosaffa<sup>5</sup>

<sup>1</sup>Student Research Committee, Nursing and Midwifery Faculty, Shahid Beheshti University of Medical Sciences, <sup>2</sup>Reproductive Endocrinology Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, <sup>3</sup>Biomaterials Department, Iran Polymer and Petrochemical Institute, <sup>4</sup>Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, <sup>5</sup>Department of Immunology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

To the Editor,

Following medical advances and the consequent increase in life expectancy during the recent decades, more women reach menopause each year.<sup>1</sup> Menopause with resultant estrogen deficiency can lead to troublesome vasomotor symptoms,<sup>2</sup> necessitating hormone replacement therapy (HRT). Despite all efforts made by the scientific community, the number of currently available treatment options has declined dramatically since the release of the Women's Health Initiative trial results.<sup>3</sup> Since it is important to make efforts to overcome various health concerns encountered during menopause,<sup>4</sup> the use of nanostructured treatments is forecasted to grow even larger in middle-aged women. There is clear evidence that transdermal estrogen delivery has significant advantages compared to other routes of drug administration, particularly with regard to venous thromboembolic risk or other conditions where the first pass hepatic metabolism should be avoided. The development of nanomedicine, as well as genomic discoveries and possibilities could have a significant beneficial effect on healthy aging.<sup>5</sup>

We read with interest the report by Botelho et al.<sup>6</sup> on nanostructured transdermal HRT for relieving menopausal

symptoms. The researchers successfully presented a picture of nanomedicine approaches in the menopausal stage. Currently, there is an interest in investigating the application of nanoparticles for relieving menopausal complaints. Our group is highly interested in this field of research and its relevant clinical applications. We would like to comment on the drug formulation used in the study which could have possibly affected the results. In a recent study, we found a similar effect of topical nanoparticle phytoestrogens compared to that in Botelho and colleagues' study.<sup>6</sup> We determined the safety and efficacy of a transdermal nanostructured formulation of phytoestrogens for relieving vasomotor symptoms. The technique developed in this study can be used to generate more "efficacious pharmaceutical products", including soluble compounds isolated from phytoestrogens.<sup>7</sup> In this regard, de Vargas et al.<sup>8</sup> described the development of topical hydrogels containing genistein-loaded nanoemulsions, which could be considered as a promising formulation for delivery of phytoestrogens into the skin.

Nanomedicine can play a role in a cure of menopausal symptoms by ensuring that a sufficient amount of the drug enters the body. Recent studies described a micellar estradiol

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Address for Correspondence: Fatemeh Abdi, Student Research Committee, Nursing and Midwifery Faculty, Shahid Beheshti University of Medical Sciences, Bldg No.2 SBUMS, Arabi Ave, Daneshjoo Blvd, Velenjak, Tehran 1983963113, Iran  
Tel: +98-21-8865-5366, Fax: +98-21-8820-2521, E-mail: abdi@sbmu.ac.ir

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formulation, which constitutes an alternative transdermal delivery system not requiring the permeation enhancers or temporary skin digestion, both of which increase the possibility of irritation which can occur with other skin delivery systems. Based on the drug delivery system, Estrasorb is a nanoparticle estradiol that it is rubbed into the skin and produces a drug depot as it is deposited in the outer skin layer.<sup>9</sup> The study by Simon<sup>10</sup> demonstrated that topical micellar nanoparticle estradiol was effective in providing significant relief of vasomotor symptom frequency and severity. In another study, Botelho et al.<sup>6</sup> investigated the efficacy of nanoemulsion testosterone and estrogen as a novel effective protocol treatment for menopausal women with low libido. Both these reports emphasized the application of nanomedicine in the treatment of menopausal complaints; however, further studies are needed. We hope this letter has showcased the extraordinary and far-reaching implications of nanomedicine for supporting healthier and more independent menopausal women.

### Conflict of Interest

No potential conflict of interest relevant to this article was reported.

### References

1. Abdi F, Mobedi H, Mosaffa N, Dolatian M, Ramezani Tehrani F. Effects of hormone replacement therapy on

- immunological factors in the postmenopausal period. *Climacteric* 2016; 19: 234-9.
2. Ahmed K, Jahan P, Nadia I, Ahmed F, Abdullah Al E. Assessment of menopausal symptoms among early and late menopausal midlife bangladeshi women and their impact on the quality of life. *J Menopausal Med* 2016; 22: 39-46.
3. Abdi F, Kazemi F, Ramezani Tehrani F, Roozbeh N. Protocol for systematic review and meta-analysis: hop (*Humulus lupulus L.*) for menopausal vasomotor symptoms. *BMJ Open* 2016; 6: e010734.
4. Lim H, Kim TH, Lee HH. A study on perception and usage status on health functional foods in women according to menopause status. *J Menopausal Med* 2016; 22: 20-30.
5. Rees M, Moghimi SM. Nanotechnology: from fundamental concepts to clinical applications for healthy aging. *Nanomedicine* 2012; 8 Suppl 1: S1-4.
6. Botelho MA, Queiroz DB, Barros G, Guerreiro S, Fachine P, Umbelino S, et al. Nanostructured transdermal hormone replacement therapy for relieving menopausal symptoms: a confocal Raman spectroscopy study. *Clinics (Sao Paulo)* 2014; 69: 75-82.
7. Abdi F. Assessment of nanostructured transdermal phytoestrogen therapy for relieving menopausal symptoms [dissertation]. Tehran, IR: Shahid Beheshti University of Medical Sciences; 2016.
8. de Vargas BA, Bidone J, Oliveira LK, Koester LS, Bassani VL, Teixeira HF. Development of topical hydrogels containing genistein-loaded nanoemulsions. *J Biomed Nanotechnol* 2012; 8: 330-6.
9. Valenzuela P, Simon JA. Nanoparticle delivery for transdermal HRT. *Maturitas* 2012; 73: 74-80.
10. Simon JA. Estradiol in micellar nanoparticles: the efficacy and safety of a novel transdermal drug-delivery technology in the management of moderate to severe vasomotor symptoms. *Menopause* 2006; 13: 222-31.