



HAL
open science

Pomegranate seed oil for nutritional management of postmenopausal osteoporosis: in vitro and preclinical studies

Mélanie Spilmont, Laurent L. Leotoing, Marie-Jeanne M.-J. Davicco, Patrice Lebecque, Sylvie Mercier, Elisabeth Miot - Noirault, Laurent Rios, Y. Wittrant, Véronique Coxam

► **To cite this version:**

Mélanie Spilmont, Laurent L. Leotoing, Marie-Jeanne M.-J. Davicco, Patrice Lebecque, Sylvie Mercier, et al.. Pomegranate seed oil for nutritional management of postmenopausal osteoporosis: in vitro and preclinical studies. 5. Colloque International Molécules et Ingrédients Santé, May 2014, Quimper, France. 2014, 5ème Colloque International Molécules et Ingrédients Santé MIS 2014. hal-02743422

HAL Id: hal-02743422

<https://hal.inrae.fr/hal-02743422>

Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Pomegranate seed oil for nutritional management of postmenopausal osteoporosis: *in vitro* and preclinical studies

Mélanie Spilmont^{1,2,3,6}, Laurent Léotoing^{1,2,3}, Marie-Jeanne Davicco^{1,2,3}, Patrice Lebecque^{1,2,3}, Sylvie Mercier^{1,2,3}, Elisabeth Miot-Noirault^{4,5}, Laurent Rios⁶, Yohann Wittrant^{1,2,3}, Véronique Coxam^{1,2,3*}

¹ INRA, UMR 1019, UNH, CRNH Auvergne, F-63009 Clermont-Ferrand, France

² Equipe Alimentation, Squelette et Métabolismes

³ Clermont Université, Université d'Auvergne, Unité de Nutrition Humaine, BP 10448, F-63000 Clermont-Ferrand, France

⁴ Clermont Université, Université d'Auvergne, Imagerie moléculaire et thérapie vectorisée, BP 10448, F-63000 Clermont-Ferrand, France

⁵ Inserm, U 990, F-63000 Clermont-Ferrand, France

⁶ GREENTECH SA Biopôle Clermont-Limagne 63360 Saint-Beauzire – France

In the current context of longer life expectancy, the prevalence of osteoporosis is increasingly important. This is why development of new strategies of prevention is highly suitable. Some dietary fats and particularly conjugated linoleic acid have a positive impact on bone formation leading to improved bone mineral density (BMD). Pomegranate seed oil (PSO) and its major component: puniceic acid, a conjugated linolenic acid specific to this fruit, have potent anti-inflammatory and anti-oxidative properties both *in-vitro* and *in-vivo*, two processes strongly involved in osteoporosis establishment. In this study, we demonstrated that PSO consumption (5% of the diet) improved significantly bone BMD and prevented trabecular microarchitecture impairment in ovariectomized (OVX) mice C57bl6j, compared to OVX control animals. Those findings are associated with transcriptional changes in bone tissue, suggesting involvement of both osteoclastogenesis inhibition and osteoblastogenesis improvement. In addition, thanks to an *ex-vivo* experiment, we provided evidence that serum from mice fed pomegranate seed oil (5% by gavage) had the ability to significantly down-regulate the expression of specific osteoclast differentiation markers and RANK-RANKL downstream signaling targets in osteoclast like cells (Raw264.7). Moreover, in osteoblast like cells (MC3T3-E1) it elicited significant increase in ALP activity, matrix mineralization and transcriptional levels of major osteoblast lineage markers involving the Wnt/ β -catenin signaling pathways may. Our data also reveal that PSO inhibited pro-inflammatory factors expression, while stimulating anti-inflammatory ones. These results demonstrate that PSO is highly relevant regarding osteoporosis. Indeed, it offers promising alternatives in the design of new strategies in nutritional management of age-related bone complications.