Protein Klotho *СУЧАСНИЙ МАРКЕР ДІАГНОСТИКИ ТА СКРИНІНГУ ЕФЕКТИВНОСТІ ЛІКУВАННЯ СТОМАТОЛОГІЧНИХ ЗАХВОРЮВАНЬ*

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Біомаркери в стоматології

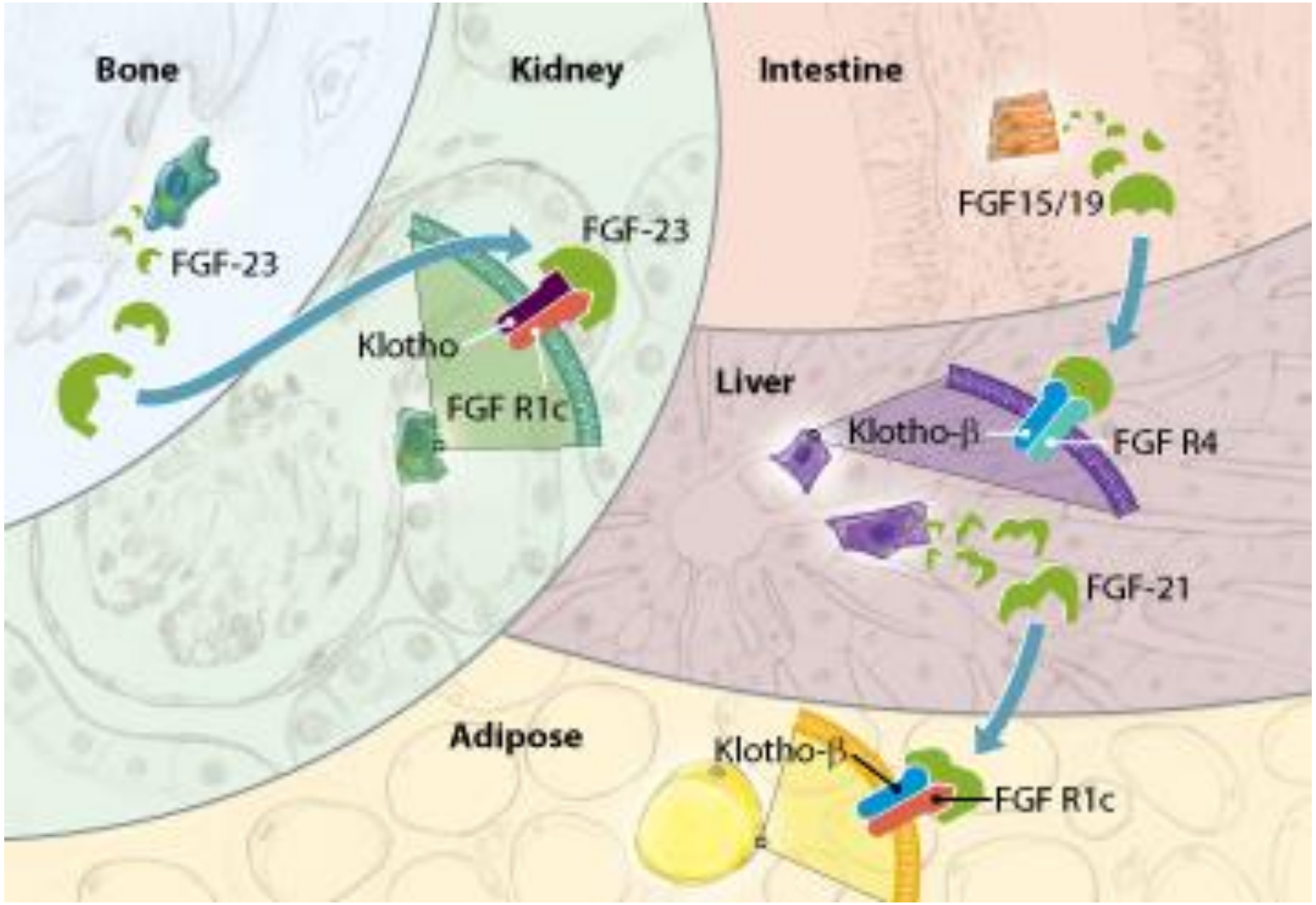
Чому це важливо !

- вони є маркерами наявності чи відсутності зазворювання,

- маркерами тяжкості патологічного процесу,

- маркери є об’єктом фармакологічної корекції

Protein Klotho є одним з головних регуляторів метаболічних процесів кісткової тканини.



FGF 23

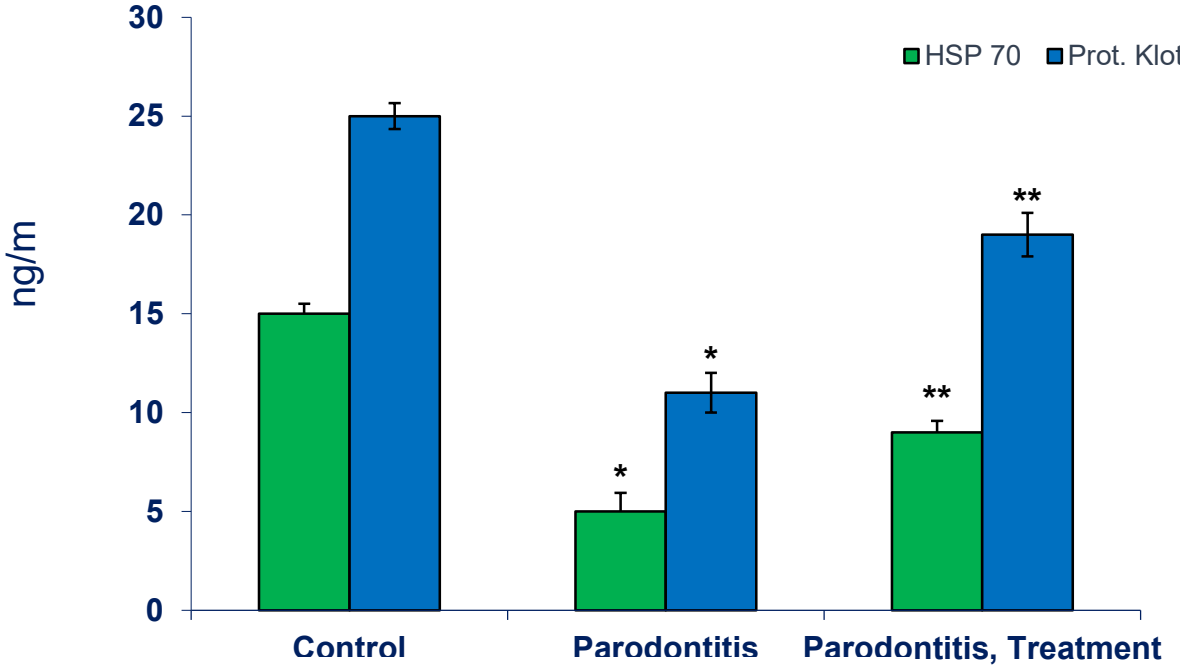
MMP

VitD

Ca $^{2+}$

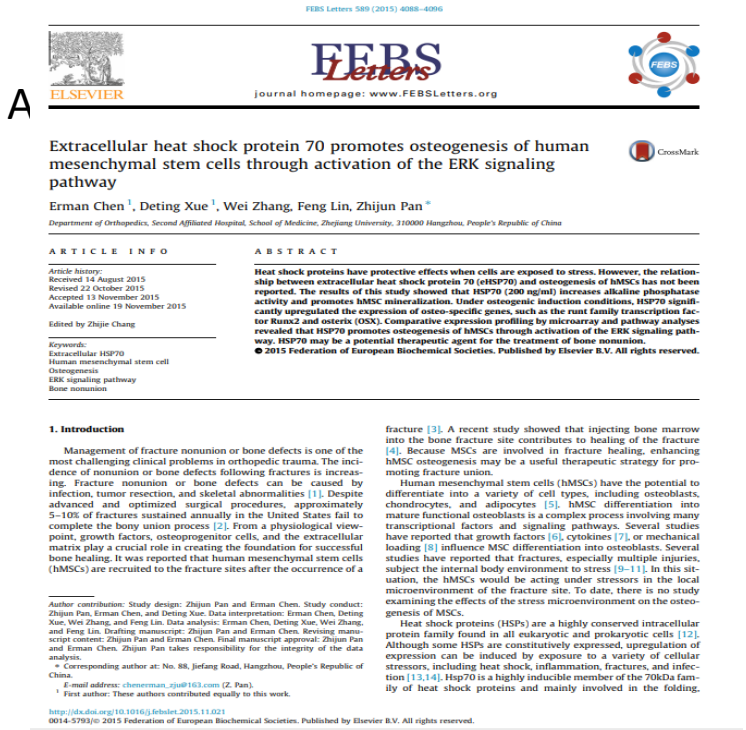
VitD

HSP 70
Protein Klotho



Level of Protein Klotho, HSP 70 (A) and Cathelicidin (LL 37) (B) in the oral fluid of periodontitis patients before and after treatment (n=25) (30-37 years old)

A



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Extracellular heat shock protein 70 promotes osteogenesis of human mesenchymal stem cells through activation of the ERK signaling pathway

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ABSTRACT

Heat shock proteins have protective effects when cells are exposed to stress. However, the relationship between extracellular heat shock protein 70 (eHSP70) and osteogenesis of hMSCs has not been reported. The results of this study showed that HSP70 (200 ng/ml) increases alkaline phosphatase activity and promotes hMSC mineralization. Under osteogenic induction conditions, HSP70 significantly upregulated the expression of osteo-specific genes, such as the runt family transcription factor Runx2 and osterix (OSX). Comparative expression profiling by microarray and pathway analyses revealed that HSP70 promotes osteogenesis of hMSCs through activation of the ERK signaling pathway. HSP70 may be a potential therapeutic agent for the treatment of bone nonunion.

1. Introduction

Management of fracture nonunion or bone defects is one of the most challenging clinical problems in orthopedic trauma. The incidence of nonunion or bone defects following fractures is increasing. Fracture nonunion or bone defects can be caused by infection, tumor resection, and skeletal abnormalities [1]. Despite advanced and optimized surgical procedures, approximately 5–10% of fractures sustained annually in the United States fail to complete the bony union process [2]. From a physiological viewpoint, growth factors, osteoprogenitor cells, and the extracellular matrix play a crucial role in creating the foundation for successful bone healing. It was reported that human mesenchymal stem cells (hMSCs) are recruited to the fracture sites after the occurrence of a fracture [3]. A recent study showed that injecting bone marrow into the bone fracture site contributes to healing of the fracture [4]. Because MSCs are involved in fracture healing, enhancing hMSC osteogenesis may be a useful therapeutic strategy for promoting fracture union.

Human mesenchymal stem cells (hMSCs) have the potential to differentiate into a variety of cell types, including osteoblasts, chondrocytes, and adipocytes [5]. hMSC differentiation into mature functional osteoblasts is a complex process involving many transcriptional factors and signaling pathways. Several studies have reported that growth factors [6], cytokines [7], or mechanical loading [8] influence MSC differentiation into osteoblasts. Several studies have reported that fractures, especially multiple injuries, subject the internal body environment to stress [9–11]. In this situation, the hMSCs would be acting under stressors in the local microenvironment of the fracture site. To date, there is no study examining the effects of the stress microenvironment on the osteogenesis of MSCs.

Heat shock proteins (HSPs) are a highly conserved intracellular protein family found in all eukaryotic and prokaryotic cells [12]. Although some HSPs are constitutively expressed, upregulation of expression can be induced by exposure to a variety of cellular stressors, including heat shock, inflammation, fractures, and infection [13,14]. Hsp70 is a highly inducible member of the 70kDa family of heat shock proteins and mainly involved in the folding.

Author contribution: Study design: Zhijun Pan and Erman Chen. Study conduct: Zhijun Pan, Erman Chen, and Deting Xue. Data interpretation: Erman Chen, Deting Xue, Wei Zhang, and Feng Lin. Data analysis: Erman Chen, Deting Xue, Wei Zhang, and Feng Lin. Drafting manuscript: Zhijun Pan and Erman Chen. Revising manuscript content: Zhijun Pan and Erman Chen. Final manuscript approval: Zhijun Pan and Erman Chen. Zhijun Pan takes responsibility for the integrity of the data analysis.

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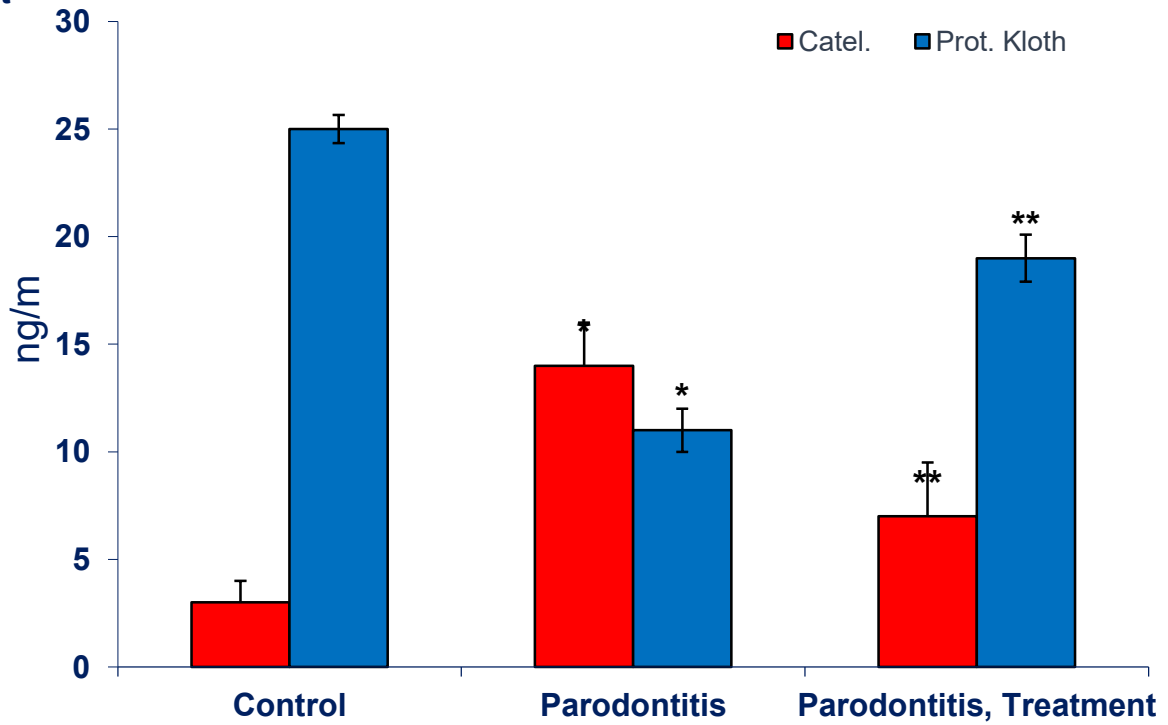
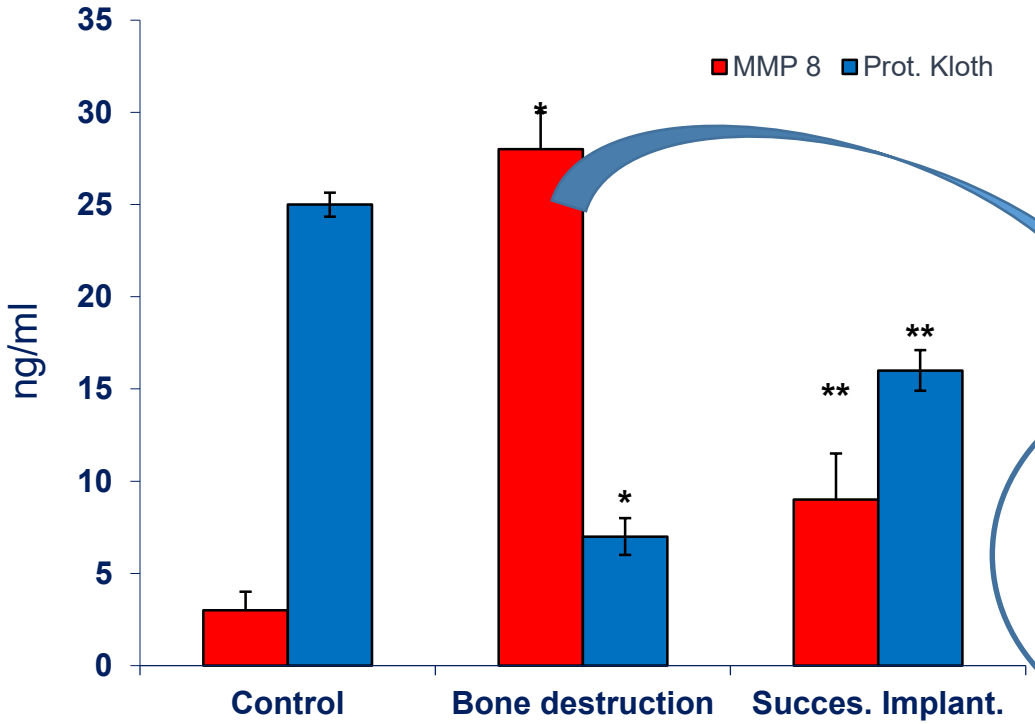
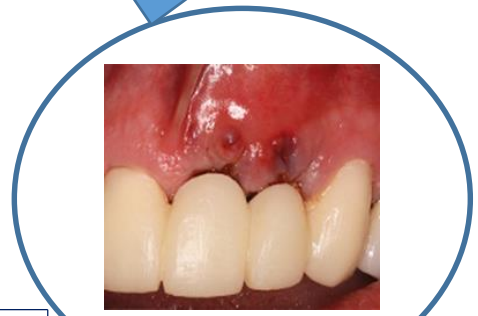
0014-5793/

B

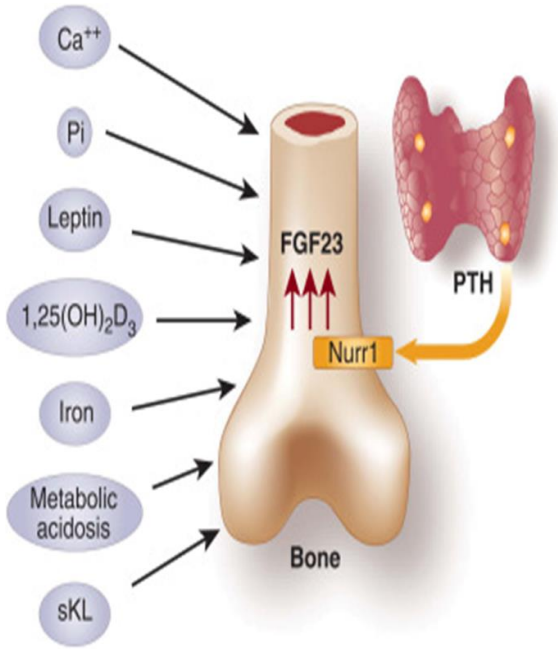


Protein Klotho, MMP 8 (A)and FGF 23 (B) in the oral fluid of patients with bone destruction and on the background of successful implantation (n=25) (30-37 years old)

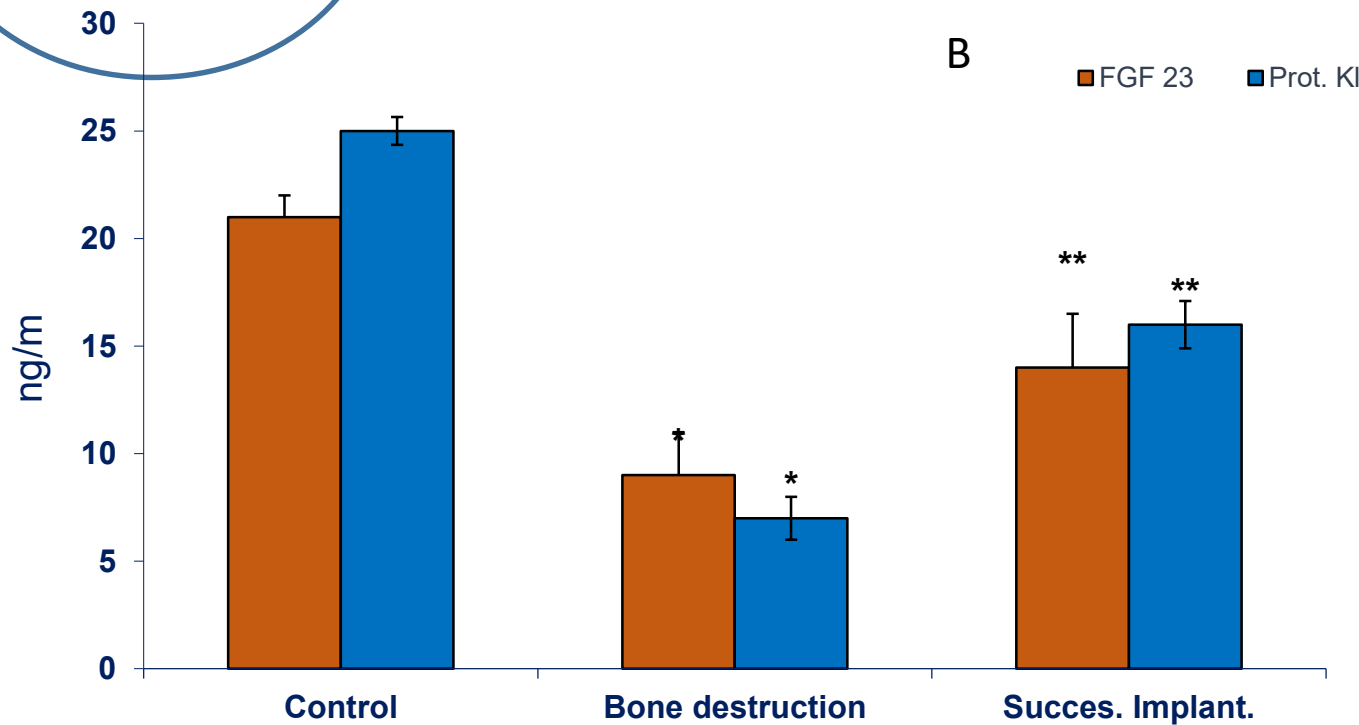




A

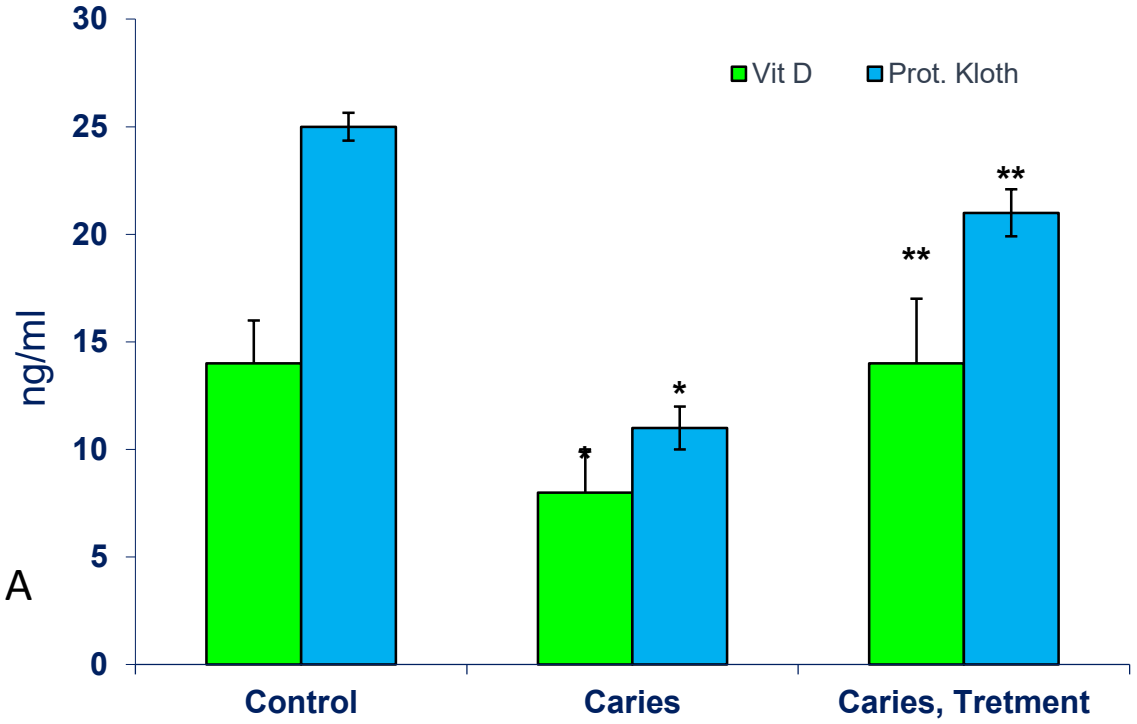


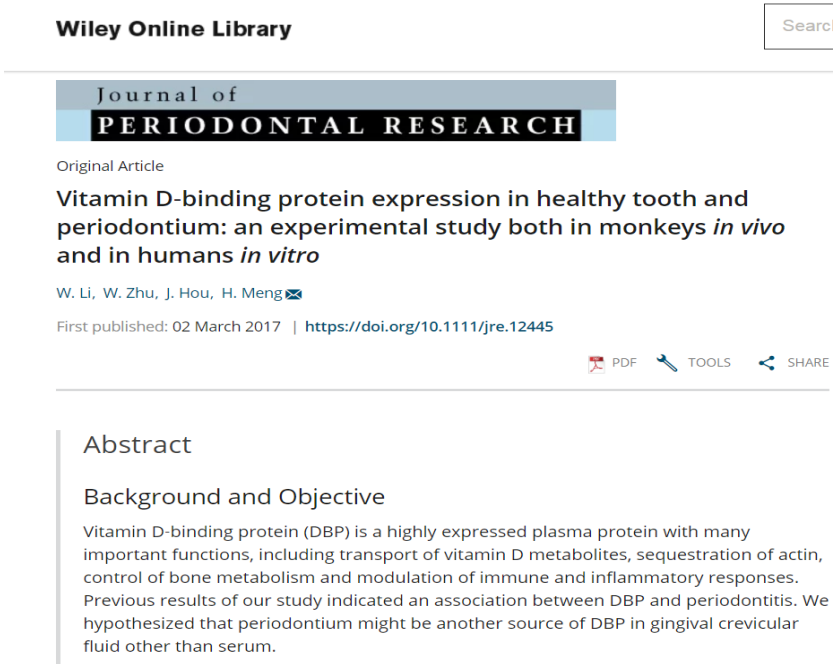
B



Vitamin D (A) and Vitamin D-binding protein (DBP) (B) in the oral fluid of caries patients before and after treatment (n=25) (30-37 years old)

A





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Original Article

Vitamin D-binding protein expression in healthy tooth and periodontium: an experimental study both in monkeys *in vivo* and in humans *in vitro*

W. Li, W. Zhu, J. Hou, H. Meng

First published: 02 March 2017 | https://doi.org/10.1111/jre.12445

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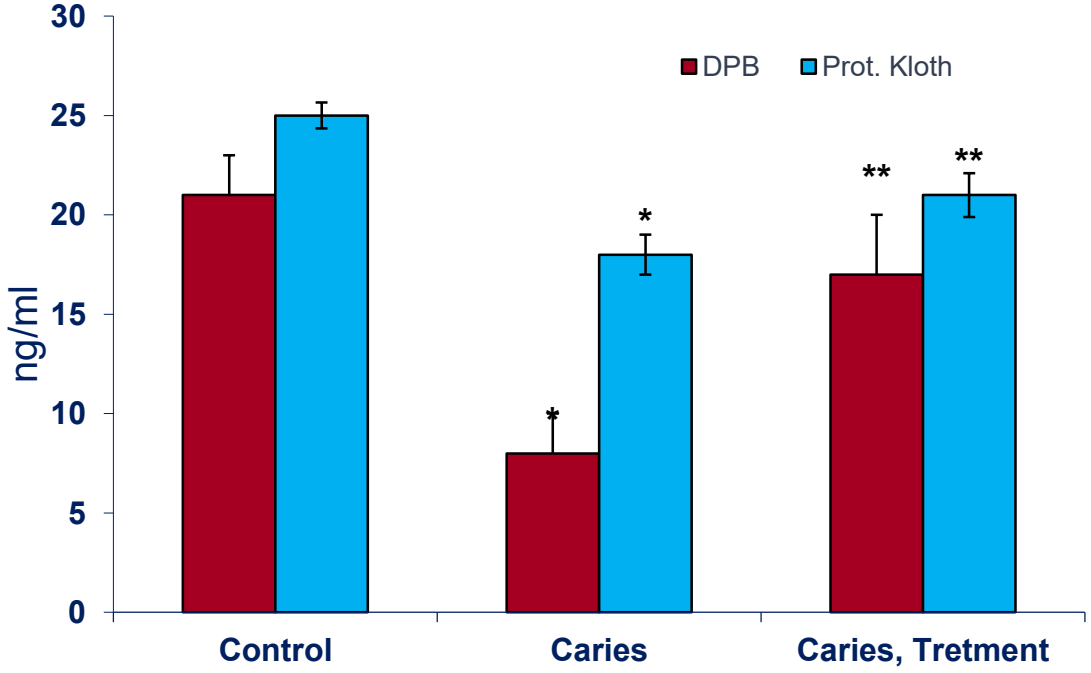
Abstract

Background and Objective

Vitamin D-binding protein (DBP) is a highly expressed plasma protein with many important functions, including transport of vitamin D metabolites, sequestration of actin, control of bone metabolism and modulation of immune and inflammatory responses. Previous results of our study indicated an association between DBP and periodontitis. We hypothesized that periodontium might be another source of DBP in gingival crevicular fluid other than serum.

B



Динаміка змін концентрації маркерів при наявності патології ротової порожнини

вітамін Д, вітамін Д зв'язуючий білок, кателіцидин, ММП 8, HSP 70 білок

Протікали на фоні змін концентрації

Protein Klotho

Protein Klotho

. інтегральний показник стану здоров’я ротової порожнини.

- успішне визначення даного маркера імуноферментним методом в ротовій рідини.
- метод простий, зручний для виконання в умовах клініки.

«ІДЕАЛЬНИЙ МАРКЕР»

- зручний маркер діагностики стоматологічних захворювань;

- зручний маркер моніторингу ефективності лікування;

- методи його визначення у ротовій рідині стандартизовані.

Ми радимо його використання у стоматологічній практиці.

ДЯКУЮ ЗА УВАГУ!