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عنوان المشروع باللغة العربية - Title of the proposed project in Arabic	دراسة ارتباط الكاديوم والكثافة المعدنية في العظام في مرحلة ما بعد انقطاع الطمث
Title of the proposed project in English	Association between Cadmium and Bone Mineral Density in Postmenopausal Osteoporotic Saudi subjects
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التخصص الدقيق للمشرف الرئيس - Specialty of PI	Nucleic acid Immunology
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المدة المتوقعة لإنجاز البحث منذ الحصول على موافقة عمادة الدراسات العليا (بالشهور) - Expected time in month to finish	12 months
Abstract of the proposal (No more than 200 words)	Cadmium (Cd) is a heavy metal produced as environmental pollutants that have adverse health effects. Normal people can be exposed to Cd through contaminated air, food, and water. Smoking is another environmental source of Cd.(1,2). Due to its long biological half-life in the body, low level of Cd exposure also could cause bone loss which may increase the risk of osteoporosis and

bone fractures (3). Several studies found that exposure to low concentrations of Cd affects bone mineral density (BMD) which may increase the risk to osteoporosis and fractures , however ,the mechanism by which cadmium exerts its toxic effect on bone has not been clarified (4,5). Cd exposure may inhibit the production of 1, 25(OH)<sub>2</sub>D, which subsequently diminish the calcium uptake in intestine (4) and may be a mechanism of osteoporosis.. Research on the association between Cd , vitamin D and bone health is meagre in Saudi population. Thus the present research is aimed to investigate the relationship between Cd concentrations in blood and bone density in a sample of Saudi population.

**Hypothesis of the proposal**

Cadmium toxicity is related to vitamin D deficiency and osteoporosis in Postmenopausal Osteoporotic Saudi subjects

**Specific objectives**

1. Recruitment of Postmenopausal Saudi subjects (100 normal and 100 osteoporotic).
2. Measurement of various anthropometric factors
3. Blood specimens collected by venipuncture and analysed for Blood cadmium , serum levels of Vitamin D , calcium , phosphorus , markers of bone formation (osteocalcin) and bone resorption markers(C-terminale telopeptide fragment of collagen type 1 (CTX-S) and bone-related hormone (parathyroid hormone; PTH).
4. To investigate association of parameters measured in objective 3 with Bone mineral density

**Methodology & Major Techniques to be used**

Subjects: A total of 200 hundred Postmenopausal Saudi subjects (100 normal and 100 osteoporotic ) will be recruited for the study. Participants will be recruited with the following criteria: did not use hormone replacement therapy, calcium or vitamin D supplement for 6 months prior to study, had no history of any other bone disease or on drug therapy which could affect bone turnover and bone mineral density (BMD). A generalized questionnaire for medical history and demographic information will be taken from all participants .

Sample analysis:

Fasting glucose, lipid profile, calcium, and phosphorous will be measured using a chemical analyzer . Serum 25 (OH) D will be measured by ELISA, Serum Cross-link C terminal peptides (CTX-S) , osteocalcin and parathyroid hormone PTH will be measured by COBAS e 411 Analyzer . Blood Cadmium will be measured by Graphite furnace atomic absorption spectrometry (GFAAS)

Statistical Analysis of data and writing of report

	Major techniques: 1.enzyme-linked immunosorbent assay(ELISA) 2. Graphite furnace atomic absorption spectrometry (GFAAS)
Availability of Samples	Yes
Availability of Chemicals	Yes
Availability of Instruments	Yes
Ethical Approval	In the process
Recent References	<p>1.Järup, A. AkessonCurrent status of cadmium as an environmental health problemToxicol. Appl. Pharmacol., 238 (2009), pp. 201-208</p> <p>2. WHO/IPCSEnvironmental Health Criteria Document 134 Cadmium Geneva, WHO (1992)</p> <p>3.M. Wallin, L. Barregard, G. Sallsten, T. Lundh, M.K. Karlsson, M. Lorentzon, C. Ohlsson, D.MellströmLow-level cadmium exposure is associated with decreased bone mineral density and increased risk of incident fractures in elderly men: the MrOS Sweden study.J. Bone. Miner. Res., 31 (2016), pp. 732-741</p> <p>4.K. Uriu, I. Morimoto, K. Kai, Y. Okazaki, Y. Okada, Y.L. Qie, N. Okimoto, K. Kaizu, T.Nakamura, S. EtoUncoupling between bone formation and resorption in ovariectomized rats with chronic cadmium exposure.Toxicol. Appl. Pharmacol., 164 (2000), pp. 264-272</p> <p>5. M.M. Brzóska, J. Moniuszko-JakoniukBone metabolism of male rats chronically exposed to cadmium Toxicol. Appl. Pharmacol., 207 (200</p>