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P107

EFFECTS OF ACUTE COAL DUST EXPOSURE ON  
THE OPG/RANKL SYSTEM OF MIDDLE-AGED MALE  
RATS

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high-cholesterol diet for 12 weeks (HF control group), a high-cholesterol diet followed by exposed to 12.5 mg/m<sup>3</sup> of PM<sub>10</sub> coal dust an hour daily in the last 4 weeks (HFD) weeks, the HFD group received the ethanolic extract of *Eucheuma cottonii* at doses 150 mg/kg BW (HFDA); 300 mg/kg BW (HFDB); and 600 mg/kg BW (HFDC). The levels of OPG, RANKL, and OPG/RANKL ratio were analyzed by ELISA technique. This study was approved by the Local Ethics Committee, Medical Faculty, Lambung Mangkurat University, Banjarmasin.

**Results:** The level of OPG was not significantly different between groups ( $P>0.05$ ). The receptor activator of NF- $\kappa$ B ligand levels was not significantly different between groups ( $P>0.05$ ). In addition, the levels of OPG/RANKL ratio was not significantly different between groups ( $P>0.05$ ).

**Conclusions:** There is no effect of ethanolic extract of *Eucheuma cottonii* on the OPG/RANKL system of atherosclerosis rats exposed to coal dust.

**References:** Setiawan B et al., Med Sci I Int J 2013;12. Setiawan B et al., J Exp Integr Med 2013;3:219. Kania N et al., Cukurova Med J 2013;38:547. Kania N et al., J Toxicol 2013;2013:528146.

#### P106

##### THE EFFECTS OF CHRONIC INHALATION COMBINED CIGARETTE SMOKE AND PARTICULATE MATTER 10 (PM10) OF COAL DUST ON THE OPG/RANKL SYSTEM IN MALE RATS

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**Aims:** This study aimed to elucidate whether chronically inhalation combined cigarette smoke and particulate matter 10 (PM10) of coal dust will affect the OPG/RANKL system in male rats.

**Methods:** Twenty-four male Wistar rats were randomly divided into four groups; one noninhaled group (control) and three combined cigarette smoke and coal dust exposed groups (concentration 6.25, 12.5, and 25 mg/m<sup>3</sup>/h/day for 6 months). The levels of OPG, RANKL, and OPG/RANKL ratio were analyzed by ELISA technique. Analysis of variance test was used to analyze the difference levels of OPG, RANKL, and OPG/RANKL ratio. This study was approved by Local Ethics Committee, Medical Faculty, Lambung Mangkurat University, Banjarmasin.

**Results:** The level of OPG was not significantly different between groups ( $P>0.05$ ). The receptor activator of NF- $\kappa$ B ligand levels was not significantly different between groups ( $P>0.05$ ). In addition, the levels of OPG/RANKL ratio was not significantly different between groups ( $P>0.05$ ).

**Conclusions:** There is no effects of chronically inhalation combined cigarette smoke and particulate matter 10 (PM10) of coal dust on the OPG/RANKL system in male rats.

**References:** Noor Z, Setiawan B, J Exp Integr Med 2013;3:69. Noor Z, Setiawan B, J Exp Integr Med 2013;3:153. Kania N et al., Cukurova M J 2013;38:547.

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#### P107

##### EFFECTS OF ACUTE COAL DUST EXPOSURE ON THE OPG/RANKL SYSTEM OF MIDDLE-AGED MALE RATS

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**Aims:** This study aimed to elucidate whether acute particulate matter 10 (PM10) coal dust exposure will affect the OPG/RANKL system of middle-aged male rats.

**Methods:** Twenty-four, middle-aged (14 months old), male Wistar rats were randomly divided into four groups; one noninhaled group (control group) and three coal dust exposed groups (concentration 6.25, 12.5, and 25 mg/m<sup>3</sup>/h/day for 1 day). The levels of OPG, RANKL, and OPG/RANKL ratio were analyzed by ELISA technique. Analysis of variance test was used to analyze the difference levels of OPG, RANKL, and OPG/RANKL ratio. This study was approved by Local Ethics Committee, Medical Faculty, Lambung Mangkurat University, Banjarmasin.

**Results:** The level of OPG was not significantly different between groups ( $P>0.05$ ). The receptor activator of NF- $\kappa$ B ligand levels was not significantly different between groups ( $P>0.05$ ). In addition, the levels of OPG/RANKL ratio was not significantly different between groups ( $P>0.05$ ).

**Conclusions:** There is no effects of acute particulate matter 10 (PM10) of coal dust on the OPG/RANKL system in middle-aged male rats.

**References:** Noor Z, Setiawan B, J Exp Integr Med 2013;3:69. Noor Z, Setiawan B, J Exp Integr Med 2013;3:153. Kania N et al., Cukurova Med J 2013;38:547.

#### P108 CONTENT OF TOXIC ELEMENTS IN THE BLOOD AND HAIR SAMPLES FROM THE NORTH

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**Aims:** Minerals are key elements of the most important chemical processes in the human body. Bone belongs to the most mineralized tissues. Accumulation of toxic elements in the body can lead to the development - disruption of the bone mineral metabolism. Our goal is to assess the content of toxic and essential elements in hair samples and blood serum in the north.

**Methods:** A total of 99 people under the age of 50 years. There were included 63 people living in the north in the group I. Group II - 36 living in the northwest. Mass spectrometry with inductively coupled plasma was measured content 10 of toxic elements (Al, Cd, Ni, Hg, Rb, Pb, Ag, Sr, Tl, Ce) and 13 of essential elements (Na, Mg, P, Ca, V, Cr, Mn, Co, Cu, Zn, As, Se, I) in serum, as well as 12 of toxic elements (Al, Cd, Ni, Hg, Rb, Pb, Ag, Sr, Tl, Ce, Ba, Be) and 19 of essential elements (Na, Mg, P, Ca, V, Cr, Mn, Co, Cu, Zn, As, Cd, Se, I, B, K, Ba, Li, Fe) in hair samples.

**Results:** Group I samples revealed increasing hair: barium (95 %), nickel (22 %), aluminum (9 %), cadmium (4 %) and strontium (4 %). Serum observed an increase of rubidium (18 %), cadmium (9 %) and mercury (4 %). In Group II, we observed a high nickel content (3 %) in hair samples. More pronounced changes are observed among the essential elements in a sample of hair, where deficiency of selenium was detected (100 %), iodine (90 %), cobalt (90 %), identified as a significant reduction in magnesium (55 %), copper (20 %), and zinc (35 %). Serum also revealed deficiency of selenium (90 %) and iodine (38 %). Despite the fact that the median calcium content in hair samples from northern residents are within the boundaries of the reference range, a number of surveyed found their reduced levels compared with the control group.

**Conclusions:** Thus the inhabitants of the north, we are seeing a significant violation of the element status, characterized by a high content of barium, nickel, aluminum, cadmium, strontium, mercury, rubidium, lead.

Against the background of the excess of toxic elements observed reduced levels of essential elements necessary for the formation and bone metabolism.

#### P109 DEPENDENCE OF BODY MASS INDEX AND OSTEOPENIC SYNDROME IN EXTREME CONDITIONS OF THE NORTH

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**Aims:** In the north, people experiencing complex effects associated with exposure to adverse factors, which leads to the development of disorders of mineral metabolism. Our study aimed to explore the dependence of bone mass and osteoporosis in people living in the north.

**Methods:** Military Medical Academy conducted a study of BMD in 63 men living in the north of Russia (Murmansk) aged 18–50 years by DXA at the X-ray bone densitometer (Osteometer DTX 200). The study excluded patients with a history of fractures available and chronic diseases. Evaluation of the results was carried out on BMD Z-score, a decrease in bone mass below the value  $\leq -2.0$ , regarded as osteoporosis. Also we measured the height and weight. During the study formed three groups according to BMI: the first group 19.5–25.9 (norm), the second group 26.0–27.9, which corresponded to overweight and third group - BMI 28.

**Results:** As a result of densitometric examination revealed a reduction in BMD Z-score  $\leq -2.0$  in 17 (26.9 %) of the test. Patients with normal BMD was 69.9 %. Under normal BMI low BMD were observed in 17 (26.9 %;  $p < 0.001$ ).

**Conclusions:** We got a positive correlation between BMI and BMD. The obtained data show the need for the prevention of osteopenic syndrome in people living in the North, which includes the elimination or reduction of the negative impact of modifiable risk factors related to diet and lifestyle, such as alcohol abuse, tobacco smoking, exercise with a load of body weight, strength exercises, balance training.

#### P110 RELATIONSHIPS BETWEEN SCLEROSTIN, BONE METABOLISM, AND BONE MINERAL DENSITY IN BILIARY ATRESIA

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# The effects of acute coal dust exposure on the OPG/RANKL system of middle-aged male rats

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## Introduction

- Osteoporosis in men causes significant morbidity and mortality (Korpi-Steiner *et al.*, 2014).
- Bone health declines gradually, often insidiously; and in light of the advancing aging population poses a serious public health issue that is not well recognized (Korpi-Steiner *et al.*, 2014).
- The rats exposed to subchronic levels of coal dust had a decreased number of osteoblasts and increased number of osteoclasts (Akbar *et al.*, 2011).
- Our previous studies showed that coal dust in single exposure or combination with another toxicant able to change bone properties and metabolisms (Noor & Setiawan, 2013a; Noor & Setiawan, 2013b).

## Objective

- This study aimed to elucidate whether acute particulate matter 10 (PM10) coal dust exposure will affect the osteoprotegerin/receptor activator of NF-kappa  $\beta$  ligand (OPG/RANKL) system of middle-aged male rats.

## Methods

24 male Wistar rats, 12 months old, active and healthy condition.

Control

Coal dust 6.25 mg/m<sup>3</sup>  
1 hour/day  
for one day

Coal dust 12.5 mg/m<sup>3</sup>  
1 hour/day  
for one day

Coal dust 25 mg/m<sup>3</sup>  
1 hour/day  
for one day

- Serum osteoprotegerin (OPG) were analyzed by ELISA technique.
- Serum receptor activator of NF-kappa  $\beta$  ligand (RANKL) were analyzed by ELISA technique.
- This study was approved by Local Ethics Committee, Medical Faculty, Lambung Mangkurat University, Banjarmasin, Indonesia

## Coal dust exposure chamber



We put weighed coal dust in bottom hole (red arrow) of black pipe then the coal dust will circulated (white arrow) and entering the chamber again via upper hole (yellow arrow). This airstream will inhaled by rats in plastic chamber. To avoid discomfort, this chamber also supply by external oxygen and place in air conditioned room (Noor & Setiawan, 2013 ab).

## Micro-nanoparticle of coal dust

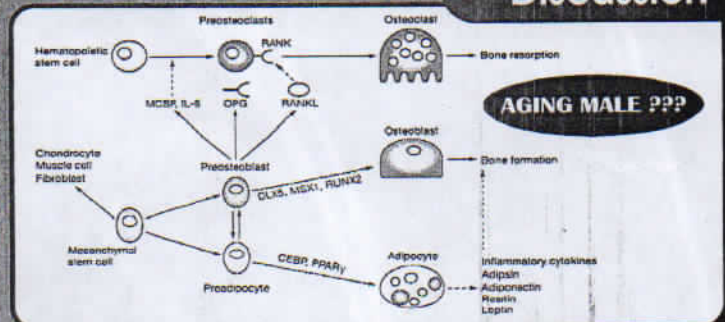


Fe	Si	Mo	Al	Ca	S	Ti	K	Mn	Cu	Yb	Cr	Ni	V
36.9	17.9	15	10	8.67	4.7	3.65	0.96	0.53	0.44	0.40	0.34	0.20	0.16

## Results

- The levels of osteoprotegerin was not significantly different between groups ( $P > 0.05$ ).
- The receptor activator of NF-kappa  $\beta$  ligand levels was not significantly different between groups ( $P > 0.05$ ).
- In addition, the levels of OPG/RANKL ratio was not significantly different between groups ( $P > 0.05$ ).

## Discussion



## Discussion

- Any dysregulation of OPG/RANKL system leads to pathological conditions such as bone tumor-associated osteolysis, immune disease, or cardiovascular pathology (Theoleyre *et al.*, 2004).
- Our study indicated that acute coal dust exposure does not affect the OPG/RANKL system in middle-aged male rats.

## Conclusion

- There is no effects of acute particulate matter 10 (PM10) of coal dust on the OPG/RANKL system in middle-aged male rats.

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