IOF Regionals
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P292
Combined Inhalation of Cigarette Smoke and Low and High Dose of Coal Dust Particulate Matter 10 (PM 10) on Bone Histology and Mineral Elements in Rats

Nia Kania, Zairin Noor, Bambang Setiawan, Nicolaas C. Budhiparama
lumbar BMD (r = -0.3345), and urinary NTX (r = 0.3409). In multiple regression analysis, only the number of vertebral fractures was an independent variable significantly associated with thoracolumbar kyphosis. There were no significant variables associated with thoracic kyphosis in multiple regression analysis.

**Conclusions:** These data suggest that among the parameters of osteoporosis, spinal kyphosis is affected by vertebral fractures in the thoracolumbar spine. The other factors excluding osteoporosis may potentially influence thoracic kyphosis.

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**COMBINED INHALATION OF CIGARETTE SMOKE AND LOW AND HIGH DOSE OF COAL DUST PARTICULATE MATTER 10 ON BONE HISTOLOGY AND MINERAL ELEMENTS IN RATS**

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**Aims:** This study aimed to elucidate whether inhalation combination of cigarette smoking and low or high dose particulate matter 10 (PM10) coal dust can change bone histology and bone mineral elements of rats.

**Methods:** A total of 30 Wistar male rats were randomly divided into five groups including one nonexposure group and four groups of combined cigarette smoke and coal dust. Dose of cigarette smoking was one cigarette per day. Dose of coal dust exposure was 6.25 and 25 mg/m²·h/day as PM10. Cigarette smoke was exposed prior to coal dust exposure every day (14 and 28 days). Exposure was done by equipment available in Department of Pharmacology, Faculty of Medicine, University of Brawijaya, Malang, East Java, Indonesia. Bone histology was analyzed in Department of Pathology, Ulin General Hospital, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, South Kalimantan, Indonesia. Bone mineral element was analyzed in femur using X-ray Fluorescence in Central and Physics Laboratory, State University of Malang, Malang, East Java, Indonesia. ANOVA test was used to analyze the difference levels of bone mineral elements and bone cells number. This study was approved by Local Ethics Committee, Medical Faculty, University of Lambung Mangkurat, Banjarmasin.

**Results:** Significant decrease of phosphorus level in combination cigarette smoke and coal dust exposure (14–6.25; 14–25; and 28–6.25) was detected when compared with the nonexposure group (P < 0.05). The level of calcium is significantly lower in 28–25 than those all groups (P < 0.05). The number of osteoblast was significantly lower in combination cigarette smoke and coal dust exposure groups than that of control group (P < 0.05). The number of osteoclast was significantly higher in combination cigarette smoke and coal dust exposure groups than that of control group (P < 0.05).

**Conclusions:** Subchronic inhalation combination of cigarette smoke and coal dust PM10 changes bone cells number, calcium and phosphorus of rats.

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**MAMMALIAN TARGET OF RAPAMYCIN (mTOR) IS REQUIRED FOR NORMAL BONE AND CARTILAGE DEVELOPMENT BUT IS ALSO INVOLVED IN CARTILAGE DESTRUCTION AND BONE REMODELLING DURING OSTEOARTHRITIS**

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**Aims:** Mammalian target of rapamycin (mTOR) is a serine/threonine kinase and a major repressor of autophagy, a cell survival mechanism. Role of mTOR in cartilage and bone biology is unknown. We created cartilage-specific mTOR knock out (KO) mice and determined the effect of cartilage-specific deletion of mTOR on cartilage and bone development and cartilage and bone changes during osteoarthritis.

**Methods:** Germline cartilage specific mTOR KO mice were created using LOXP/Cre System. We also created inducible cartilage-specific in which Cre is under the control of doxycycline to achieve mTOR deletion in adult mouse. In mTOR Germline KO mouse, endochondral ossification, growth plate organization and bone density were observed. Inducible mTOR KO mice were subjected to mouse model of OA and kinetics of cartilage degradation and bone remodelling were observed.

**Results:** Our studies show that mTOR is essential for normal bone and cartilage development. Particularly, we show that cartilage-specific germ-line mTOR KO mouse exhibit serious developmental effects associated with reduced primary ossification process, reduced length of long bones, disorganized growth plates and reduced bone density. To bypass the developmental defects associated with germ-line mTOR KO mouse, we used inducible mTOR KO mouse and subjected these mice to DMM model of OA surgery. Our results first show that cartilage-specific deletion of mTOR results in upregulation in the expression of key autophagy genes including ULK1, LC3B and ATG5. Further, compared to wildtype (WT) mice, all mTOR KO mice exhibited significant
COMBINED INHALATION OF CIGARETTE SMOKE AND LOW AND HIGH DOSE OF COAL DUST PARTICULATE MATTER 10 (PM 10) ON BONE HISTOLOGY AND MINERAL ELEMENTS IN RATS

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Introduction

- Trabecular bones in both rats and humans is influenced by mechanical, hormonal, biological and/or toxic processes (1, 2).
- Smoking has been established as risk factor for cardiovascular and pulmonary disease, and also bone disease (3).
- Smokers who work in an industrial setting maybe exposed to combination of toxicants.
- Rats exposed to sub-chronic levels of coal dust had a decreased number of osteoblast and increased number of osteoclast (4).

Objective

- This study aimed to elucidate whether inhalation combination of cigarette smoking and low or high dose particulate matter 10 (PM10) coal dust can change bone histology and bone mineral elements of rats.

Material and Methods

- 30 Male Wistar rats, 3 months old, healthy condition.
- Experimental groups were divided into:
  - Control
  - Cigarette smoke exposure
  - Coal dust exposure
  - Cigarette smoke + Coal dust exposure

Cigarette smoke and coal dust exposure chamber

- The analysis of gaseous phase of cigarette smoke showed tar, nicotine and CO concentration in mainstream smoke are 2.90 ppm, 44.30 ppm, and 102.30 ppm, respectively.

Results

- Significant decrease of phosphorus level in combination cigarette smoke and coal dust exposure (14-6.25; 14-25; and 28-9.5) was detected when compared with the nonexposure group (P < 0.05).
- The level of calcium is significantly lower in 28-25 than those all groups (P < 0.05).
- The number of osteoclast was significantly lower in combination cigarette smoke and coal dust exposure groups than that of control group (P < 0.05).
- The number of osteoclast was significantly higher in combination cigarette smoke and coal dust exposure groups than that of control group (P < 0.05).

Discussion

- Anorganic compound has a valency of 2+ can act as a substitute for calcium which was one of the reason for lower calcium level in this study.

Discussion

- Mechanisms of osteoporosis triggered by cigarette smoke and coal dust (4).

Conclusion

- Sub-chronic inhalation combination of cigarette smoke and coal dust PM10 changes bone cells number, calcium and phosphorus of rats.

References

CERTIFICATE OF POSTER PRESENTATION

We Cyrus Cooper, Tai Pang Ip, Timothy Kwok & Sue Lo certify that:

NIA KANIA

P292/ COMBINED INHALATION OF CIGARETTE SMOKE AND LOW AND HIGH DOSE OF COAL DUST PARTICULATE MATTER 10 ON BONE HISTOLOGY AND MINERAL ELEMENTS IN RATS

Has attended the IOF Regionals: 4th Asia-Pacific Osteoporosis Meeting, Hong Kong Convention and Exhibition Centre, Hong Kong, December 12-15, 2013.

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Co-chair
Scientific Committee

TAI PANG IP
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Nia KANIA

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Instructions for Poster Presentation

Dear Dr Nia KANIA,

We are pleased to inform you that your abstract entitled “COMBINED INHALATION OF CIGARETTE SMOKE AND LOW AND HIGH DOSE OF COAL DUST PARTICULATE MATTER 10 ON BONE HISTOLOGY AND MINERAL ELEMENTS IN RATS”, previously referenced as IOFHK13-1286, has been accepted for a poster presentation. Please note that your Abstract has been re-numbered and your final number is: P292. This final ID is to be used for your presentation as well as for any further correspondence.

In order to answer questions from the poster viewers, to provide more information and to discuss your results with your colleagues, you are expected to be present at your poster in the Poster Area from 15.12.2013 13:30 to 15.12.2013 14:30.

INSTRUCTIONS FOR POSTER PRESENTERS

- Each poster will be displayed for one day only.
- At least one presenter is required to be present during the poster presentation day.
- All posters must be put up no later than 09:00 on the day of presentation and must be taken down by the end of the presentation day. Unclaimed posters will be taken down and disposed at the end of the presentation day.

Poster Size
The poster board assigned to each presenter is 2.5 m in height (H) by 1m in width (W). Only one board will be assigned for each poster presentation. The recommended size of poster is A0 Size – 1189mm (H) by 841mm (W) in portrait orientation.

Poster Display and Presentation

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1 Mounting: Mounting material will be available at the Poster Help Desk and/or on the poster board.
2 Display: Posters should be displayed according to your assigned poster number on assigned day.
3 Poster Presentation Schedule: All authors are kindly requested to be present at their posters.
4 Dismantling: Posters need to be dismantled after the last Afternoon Coffee Break of assigned day. The Meeting Organizers take no responsibility for posters which are not dismantled on time.
Should you have any queries, please do not hesitate to contact Maybo Fok (iofhongkong2013@icc.com.hk).

**Important Note**
Presenting authors of accepted abstracts are required to be registered delegates and be responsible for all expenses incurred in the production of their presentations, travel and accommodation during the Meeting.

IOF thanks you for your valuable contribution to the IOF Regionals – 4th Asia-Pacific Osteoporosis Meeting’s scientific programme.

We look forward to seeing you in Hong Kong!

With kindest regards,

Cyrus Cooper  
Meeting Co-Chair  
Scientific Committee

Tai-Pang Ip  
Meeting Co-Chair  
Scientific Committee