TACSM Abstract

Ectopic Bone in the Lungs and Spleen of Male Fisher-344 Rats

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ABSTRACT

Previous experimental data demonstrated ossified particles (OSP, i.e., bone-like particles) in the circulation of rodents as well as human subjects. Their ability to circulate could ultimately permit access to vital tissues, potentially leading to ectopic bone formation. Although the fate of OSP is yet unclear, their entry into soft tissues and organs may initiate pathological processes. **PURPOSE**: We sought to determine the presence of bone in the soft organs. **METHODS**: Young (6-mon; n=10) and old (24-mon; n=10) male Fisher-344 rats were anesthetized (3% isoflurane to oxygen balance) and euthanized by removal of the heart. Body mass (g) was determined prior to dissecting the right and left lungs and spleen. The tissues were stored in 10% formalin for 3 days at 4°C and then in 70% EtOH at -20°C until analysis. They were subsequently scanned (55 kVp and 145 µA) at 15µm via micro-computed tomography (µCT 45; Scanco Medical, Inc. Switzerland). To determine bone volume within the tissues, the entire lungs and spleen were analyzed. One-Way ANOVAs were used to determine significant differences in body mass (g), right lung mass (g), left lung mass (g), spleen mass (g), bone volume in the right lung (μm^3), bone volume in the left lung (μm^3), bone volume in the spleen (μm^3), bone volume relative to right lung mass ($\mu m^3/g$), bone volume relative to left lung mass ($\mu m^3/g$), and bone volume relative to spleen mass ($\mu m^3/g$). A p value of 0.05 was set *a priori*. Data are presented as Means ± Standard Deviation. **RESULTS**: Body mass was higher ($p<0.05$) in the old vs. young rats (400 ± 31g vs. 352 ± 27g, respectively). Right lung mass was higher ($p<0.05$) in the old vs. young group (1.00 ± 0.17g vs. 0.73 ± 0.09g, respectively). Left lung mass (0.54 ± 0.14 g vs. 0.58 ± 0.16g, respectively) and spleen mass (0.75 ± 0.05g vs. 2.01 ± 2.34g, respectively) did not differ between the young and old groups. Bone volume in the right (187.8 ± 113.8 μm^3 vs. 34.8± 21.6 μm^3, respectively) and left (71.2 ± 54.7 μm^3 vs. 21.0 ± 7.4 μm^3, respectively) lungs were higher ($p<0.05$) in the old vs. young rats. Bone volume in the spleen (5.3 ± 12.7 μm^3 vs. 2.6 ± 4.2 μm^3, respectively) did not differ between young and old rats. When normalized to right lung mass (young, 49.2 ± 32.5 $\mu m^3/g$ vs. old, 186.6 ± 117.8 μm^3 /g) and left lung mass (young, 42.2 ± 17.5 $\mu m^3/g$ vs. old, 127.0 ± 92.2 $\mu m^3/g$), bone volumes were higher ($p<0.05$) with advancing age. When normalized to spleen mass (young, 7.4 ± 18.0 $\mu m^3/g$ vs. old, 2.3. ± 5.5 $\mu m^3/g$), no differences were observed. **CONCLUSION**: We speculate that the presence of bone in the soft organs (i.e., ectopic bone formation) is associated with OSP in the circulation. Ectopic bone formation was exacerbated in the right and left lungs with advancing age. The presence of bone in the soft organs may contribute to a diverse number of pathologies.

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