# Poster Exhibition

## 10. Metabolic and Bariatric Surgery

PE 10-01 10. Metabolic and Bariatric Surgery

# Effects of dehydroepiandrosterone administration on metabolic homeostasis and antioxidant status after sleeve gastrectomy in male rats

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**Background:** Sex hormones dysfunctions bring about pathological changes in different organs of the body. Findings obtained from in vivo and in vitro studies point out those sex steroids hormones have a strong impact on oxidative stress.Sleeve gastrectomy has been used for the surgical treatment of morbid obesity.
The aim of the present study was to determine the effects of dehydroepiandrosterone (DHEA) administration on metabolic homeostasis, oxidative stress parameters in male rats.

**Method:** Sixty-four male Wistar albino rats were divided into control (n:12), and experimental (n:12) ,groups and underwent sleeve gastrectomy. Experimental group rats received a single dose of DHEA (100 mg/100 g) in the operation day. Rats were sacrificed on postoperative day 7. Serum DHEA hormones were analysed. The supernatants were used to measure total oxidant status, total antioxidant status, nitric oxide and malondialdehyde levels. All tissue parameters were analysed by spectrophotometric methods. Oxidative stress index values were calculated.

**Results:** DHEA stimulating hormone levels in both the control and DHEA group did not significantly change on the 7th postoperative day . Free DHEA levels were significantly higher in DHEA group rats than in control group rats (DHEA vs control. Although total oxidant status levels did not altered by thyroid hormone treatment , total antioxidant status levels significantly decreased. Oxidative stress index values were not statistically different in tissues . Tissue nitric oxide levels were also similar in both groups. Malondialdehyde levels increased in DHEA given rats compared with the control group.

**Conclusion:** This study showed that total oxidant status levels and oxidative stress index values were similar in both groups. However, DHEA supplementation induced lipid peroxidation by increasing tissue malondialdehyde levels that might deplete tissue antioxidant level.

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# Predicting Postoperative Bone Mineral Density Loss in Metabolic and Bariatric Surgery Patients Using Multi-Modal Machine Learning Integrating DXA and Biochemical Markers

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**Background:** Postoperative Bone Mineral Density (BMD) loss is a major concern for patients after Metabolic and Bariatric Surgery (MBS), increasing their risk of fractures and osteoporosis. Traditional risk assessments fail to account for complex factors leading to BMD loss. This study aims to develop a machine learning model to predict BMD loss by combining DXA imaging data with biochemical markers, offering significant improvement in personalized care.

**Methods:** We studied 300 patients undergoing metabolic and bariatric surgery, using data from DXA scans and biochemical profiles collected preoperatively and at 3-, 6-, and 12-months post-surgery. DXA measured bone mineral density, T-scores, and bone geometry. Biochemical markers included calcium, vitamin D, parathyroid hormone, and bone turnover indicators. Data were normalized and missing values addressed. A Convolutional Neural Network analyzed DXA data, a Random Forest processed biochemical data, and a stacking ensemble integrated the predictions. Model performance was assessed using Mean Squared Error, R-squared, and Mean Absolute Percentage Error.

**Results:** The machine learning model showed high accuracy in predicting postoperative bone mineral density (BMD) loss. At 12 months post-surgery, it achieved a Mean Squared Error (MSE) of 1.4%, a Mean Absolute Percentage Error (MAPE) of 6.8%, and an R-squared ($R^2$) of 0.82. The Convolutional Neural Network (CNN) component effectively detected early bone changes in DXA scans. Key predictors of significant BMD loss included a low baseline T-score (2.9-fold risk increase), high preoperative parathyroid hormone levels (1.7-fold risk increase) and decreased postoperative vitamin D (2.1-fold risk increase). Elevated bone turnover and nutritional deficiencies were also strongly linked to greater BMD loss.

**Conclusion:** Our machine learning model accurately predicts bone mineral density (BMD) loss in bariatric surgery patients using DXA imaging and biochemical data. This tool enables early identification of high-risk individuals, allowing targeted interventions to prevent BMD loss. It sets a new standard for predictive care in bariatric surgery.