EM-01 Characterisation of novel fat-derived hormones using proteomics-based approaches

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Introduction: Fat tissue (adipose) has recently been recognised as an important endocrine organ that secretes a wide range of hormones involved in the regulation of energy metabolism and cardiovascluar tone. The major objective of this study is to use modern proteomics based approach for systematic identification and characterisation of fat-derived hormones with therapeutic potential.
Methods: Secreted proteins from 3T3 L1 preadipocytes and mature adipocytes were separated by high-resolution two-dimensional gel electrophoresis (2-DE). Differentially-secreted proteins from these cells were detected by PDQUEST software, and identified by N-terminal protein sequencing and MALDI-TOF mass spectrometry.
Results and conclusion: 1. We have found several posttranslationally modified isoforms of adiponectin, a novel hormone with anti-diabetic, anti-inflammatory and anti-atherogenic functions. Further mass spectromic analysis detected several lysine residues within the collagenous domain that are hydroxylated and glycosylated. Mutational studies indicated that these modifications are critically important for the anti-diabetic and anti-inflammatory functions of adiponectin.
2. We have identified a novel fat-derived hormone, which we named as adipocyspin. 2-DE analysis found that expression of adipocyspin was induced during adipose conversion. Computer modelling suggested that adipocyspin shares structural homology with family members of cysteine protease inhibitors. Functional analysis using recombinant adipocyspin demonstrated that this secretory protein could inhibit adipose conversion of 3T3 L1 preadipocytes. This result suggests that adipocyspin might act as a feedback regulator of fat formation (adipogenesis), and that adipocyspin or its agonists could be used as anti-obesity agents.

EM-02 Predictors of low bone mass in young Chinese women

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Introduction: Low peak bone mass is a major risk factor for postmenopausal osteoporosis. Identifying premenopausal women with low bone mass is a cost-effective approach towards prevention of osteoporosis and related fractures in later life.
Method: Demographic information and clinical data were obtained from 544 healthy pre-menopausal Chinese women, aged 18-39 years, who were recruited from the community. Predictors of bone mass were assessed using a standardized questionnaire. Bone mineral density (BMD) was assessed using dual-energy X-ray absorptiometry (DXA) at the femoral neck and lumbar spine. Bone mass was considered low if the T-score was <-1.00, i.e., 1 standard deviation below the peak young mean for the local population.
Results: The mean age of the cohort was 31.9 +/- 5.7 years. 19% and 26% of our cohort were classified to be low bone mass at lumbar spine and femoral neck respectively. Multivariate logistic regression model revealed that low body weight was the only independent predictor for low bone mass at both the spine (Odds ratio 5.3, confidence intervals 3.3-8.7, $p<0.0001$) and femoral neck (Odds ratio 4.4, confidence intervals 2.9-6.8, $p<0.0001$) while daily weight bearing time of less than 1 hour was an additional risk factor for low bone mass at lumbar spine (Odds ratio 4.0, confidence intervals 1.1-14.2, $p=0.03$). All other factors including height, menarche age, calcium intake, family history of fracture, use of calcium supplement, contraceptive pill use and smoking or drinking habit were not predictive of peak bone mass in these young women.
Conclusion: Low body weight and lack of weight bearing exercise are the two most important risk factors for low peak bone mass in Chinese women. Early intervention in this group of women may reduce the risk for osteoporosis in later life.