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Tissue-specific regulation of STAT3 and receptors for androgen and estrogen by dietary soy protein and active soybean trypsin inhibitors in rats

*Chaowu Xiao**, Health Canada, Ontario, Canada
Lee Cunningham, Health Canada, Ontario, Canada
Maryline Lalande, Health Canada, Ontario, Canada
Melissa Riding, Health Canada, Ontario, Canada

Soy foods can contain high levels of active soybean trypsin inhibitors (SBTI) if they are not properly processed. The potential adverse effects of high active SBTI intake are not fully understood. This study examined the effects of dietary proteins and active SBTI on pancreatic weight, trypsinogen production and expression of androgen receptor (AR), estrogen receptor (ER), STAT3 proteins and STAT3 phosphorylation in different tissues of rats. Weanling Sprague-Dawley rats were randomly divided into 3 groups and fed diets containing 20% protein from either casein or soy protein (SP) in the presence of the same amount of active or inactive SBTI for 8 wks. The protein abundances of trypsinogen in pancreas, ER, AR, STAT3, and phosphorylated STAT3 (p-STAT3) in pancreas, liver and uterus were determined by Western Blot. The results showed that intake of active SBTI markedly increased the pancreatic weights and acinar cell secretion of trypsinogen and caused acinar cell hypertrophy. Rats fed the casein diet had significantly higher STAT3 and p-STAT3, but lower ER content in the liver compared to rats fed the SP diets ($p < 0.05$). Active SBTI significantly reduced pancreatic p-STAT3, STAT3, AR and ER, and increased uterine ER compared to inactive SBTI or casein diets ($p < 0.05$). Overall, this study demonstrated that consumption of soy protein markedly reduced STAT3, STAT3 phosphorylation and enhanced ER abundance in the liver while active SBTI attenuated pancreatic STAT3, AR, ERb expression and increased uterine ER abundance. The physiological significance of these cellular events remains to be determined. (Research Supported by Health Canada)