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## Abstracts

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## 144/1489

## INFLAMMATORY BIOMARKERS IN CHILDREN AND ADOLESCENTS WITH AND WITHOUT DOWN SYNDROME

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**Background and objectives:** Inflammation has been related to cardiovascular and metabolic diseases such as atherosclerosis and type 2 diabetes. An excess of adipose tissue is well known to produce an elevation in inflammatory biomarkers, although these alterations have been less studied among children and adolescents, particularly in a very special group such as individuals with Down syndrome. Therefore, the aim of the current study was to evaluate possible associations between inflammatory biomarkers [C3 and C4 complement factors and C-reactive protein (CRP)] and fatness in a relatively large sample of children and adolescents without and with Down syndrome (DS).

**Methods:** A total of 355 children and adolescents (101 with DS) aged 10–20 years-old, were recruited in the UP&DOWN study. C3 and C4 complement factors and C-reactive protein (CRP) were selected as inflammatory biomarkers. Height, weight and skinfolds were measured and waist-to-height ratio (WHtR), Body Mass Index (BMI) and body fat percentage were calculated. A multivariable analysis was executed to take confounder variables into account (age, gender, waist perimeter, birth weight, triceps and subscapular skinfolds). The relationship between the main and secondary variables was made by multivariable regression model.

**Results:** C3 complement factor level was higher in the whole sample of children and adolescents with a higher WHtR ($p<0.001$). In addition, C4 complement factor level was higher in all these subjects with a higher WHtR and BMI ($p<0.001$). The same result for CRP was found in relation to body fat percentage ($p<0.001$). However, these inflammatory biomarkers were higher in subjects with DS, independently of their percentage of body fat, WHtR or Body Mass Index ($p<0.001$) according to the ANOVA test.

**Conclusions:** These results point out that anthropometric measurements such as WHtR, BMI or body fat percentage could be a useful tool to screening possible alterations in some inflammatory biomarkers in children and adolescents. Nevertheless, in the case of DS subjects, these inflammatory biomarkers are elevated, independently of their anthropometric values, leading consequently, to be at a higher risk of chronic diseases.

**Keywords:** inflammatory biomarkers; children; adolescents; Down syndrome.

## 144/1493

## THE ROLE OF SALVIA HISPANICA L AS IMMUNO-NUTRITONAL MODULATOR OF HEPATIC LIPID HOMEOSTASIS

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**Background and objectives:** Chia (Salvia hispanica L.) has been regarded as an important source of nutrients as well as several different bioactive compounds. This study aims to evaluate the potential of Salvia hispanica L (Chia) to selectively modulate innate immune TLR4-mediated signaling restraining the growth of hepatoblastoma cells and metabolic programming of macrophages.

**Methods:** A preclinical diet-induced innate immune toll-like receptor (TLR)-4 conditioned model was used to identify innate immune potential of Chia. Mechanistic studies were further performed using hepatoblastoma (HepG2, HB-8965®) cells and the humanized macrophage-like HB-8902® cell line to prove the TLR4 activation potential of the salt-soluble fraction (SSFch) from Chia seeds (defatted).

**Results:** Feeding an innovative Chia-containing bread formulation to a preclinical model with dietary iron-conditioned TLR4 signaling was shown effective to upregulate the hepatic expression of peroxisome proliferator-activated receptor-gamma (PPARγ), which has been shown to suppress inflammation and limit tumor progression in vivo. This observation was accompanied of a restrained production of hepatic hepcidin associated to TLR4 activation. HepG2 cells revealed that upregulation of TLR4 expression (mRNA) was not reflected on IL-6 production that can explain the in vivo hamp levels. Thus, salt-soluble proteins from chia prevent the impairment of hepatic fatty acid oxidation. Measurements of the oxygen consumption rate by HB-8902 cells in presence of SSFch clearly showed increased oxygen consumption by non-mitochondrial enzymes. Lipid mediator profiles (epoxyoctadecenoic acids known as leukotoxins) change with macrophage phenotype.

**Conclusions:** It is concluded that Chia, as ingredient in bread-making, and particularly SSFch promoted beneficial innate immune TLR4-mediated metabolic changes for the regulation of lipid mediators under inflammatory circumstances.

**Keywords:** Salvia hispanica L, Chia, hepatoblastoma, macrophages, protease inhibitors

**Conflict of Interest Disclosure:** Acknowledgements: This work was financially supported by grants AGL2016-75687-C2-1-R from the Ministry of Economy, Industry and Competitiveness, Spain. J.M.L. thanks MINECO for his 'Ramón y Cajal' contract.

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Reference

# Title: 144/1493 'The role of *Salvia hispanica* L as immunonutritonal modulator of hepatic lipid homeostasis'

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## Background and Objectives:

Chia (*Salvia* hispanica L.) has been regarded as an important source of nutrients as well as several different bioactive compounds. This study aims to evaluate the potential of Salvia hispanica L (Chia) to selectively modulate innate immune TLR4-mediated signaling restraining the growth of hepatoblastoma cells and metabolic programming of macrophages.

## Methods:

A preclinical diet-induced innate immune toll-like receptor (TLR)-4 conditioned model was used to identify innate immune potential of Chia. Mechanistic studies were further performed using hepatoblastoma (HepG2, HB-8965®) cells and the humanized macrophage-like HB-8902® cell line to prove the TLR4 activation potential of the salt-soluble fraction (SSFch) from Chia seeds (defatted).

## Results:

Feeding an innovative Chia-containing bread formulation to a preclinical model with dietary iron-conditioned TLR4 signaling was shown effective to upregulate the hepatic expression of peroxisome proliferator-activated receptor-gamma (PPARγ), which has been shown to suppress inflammation and limit tumor progression in vivo. This observation was accompanied of a restrained production of hepatic hepcidin associated to TLR4 activation. HepG2 cells revealed that upregulation of TLR4 expression (mRNA) was not reflected on IL-6 production that can explain the in vivo hamp levels. Thus, salt-soluble proteins from chia prevent the impairment of hepatic fatty acid oxidation. Measurements of the oxygen consumption rate by HB-8902 cells in presence of SSFch clearly showed increased oxygen consumption by non-mitochondrial enzymes. Lipid mediator profiles (epoxyoctadecenoic acids known as leukotoxins) change with macrophage phenotype.

## Conclusions:

It is concluded that Chia, as ingredient in bread-making, and particularly SSFch promoted beneficial innate immune TLR4-mediated metabolic changes for the regulation of lipid mediators under inflammatory circumstances.

## Keywords:

*Salvia hispanica* L, Chia, hepatoblastoma, macrophages, protease inhibitors

## Conflict of Interest:

Authors have nothing to disclose. Acknowledgements: This work was financially supported by grants AGL2016-75687-C2-1-R from the Ministry of Economy, Industry and Competitiveness, Spain. J.M.L. thanks MINECO for his 'Ramón y Cajal' contract.