# Ovalbumin Structural Changes by Phenolic Compounds Interactions

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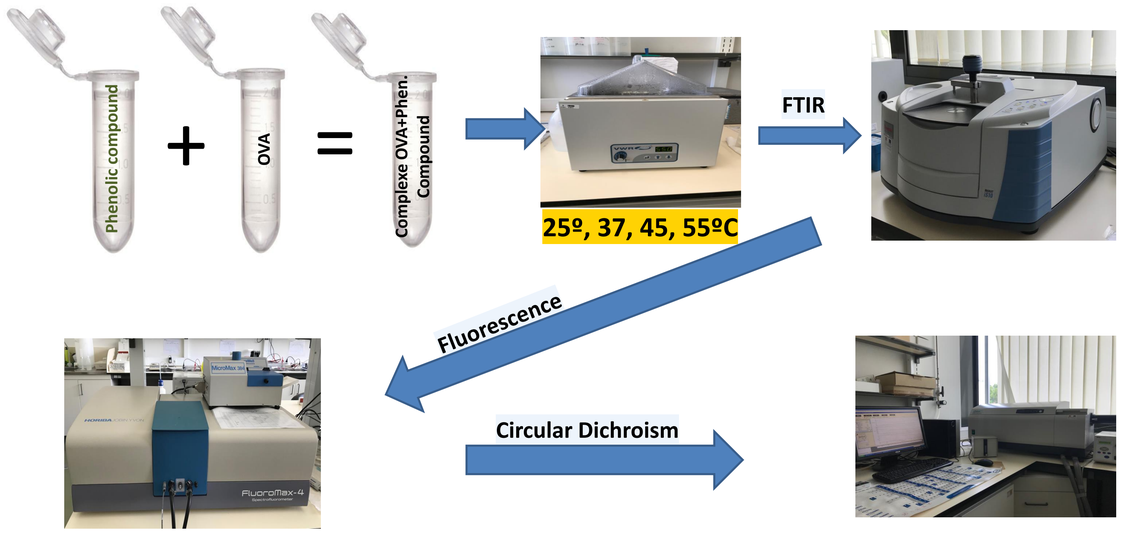
## BACKGROUND

Interactions between different compounds present in foods have influence on the functional properties of food products. Ovalbumin (OVA) is the major protein in egg white, and can causes IgE-mediated food allergic reactions particularly in children. It has been shown that the interaction of some allergens with polyphenols, led to permanent modification of the tertiary structure of the allergen, which can result in a reduction in its IgE-binding capacity (1). The factors that affects the formation of complexes, are: temperature, pH, salt concentration and addition of certain reagents (2).

## AIM

To analyse the effect of phenolic compounds (Gallic, Caffeic, Ferulic, Chlorogenic and Tannic Acids, Resveratrol and Quercetin) on the native structure of OVA, using Circular Dichroism (CD), fluorescence and Fourier transform infrared spectroscopy (FTIR**).**

## MATERIALS AND METHODS




## RESULTS AND DISCUSSION

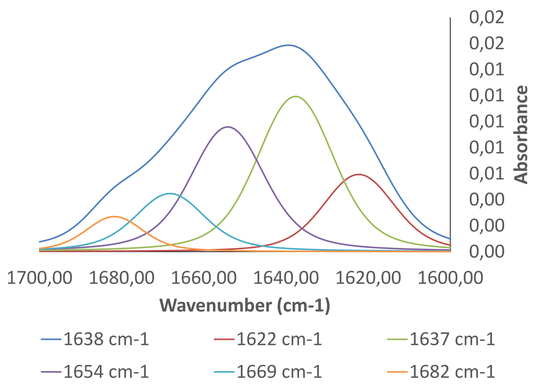



**Figure 1.** OVA in absence of phen comp 45º-15

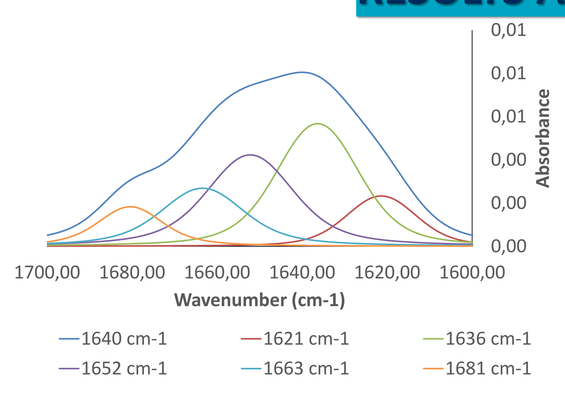



**Figure 2.** OVA in presence of GA 45º-15

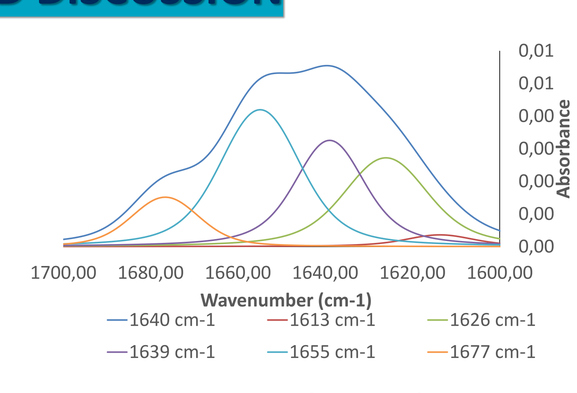



**Figure 3.** OVA in presence of TA 45º-15´

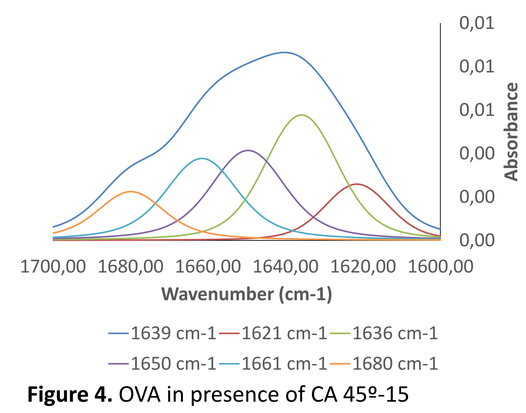



**Figure 4.** OVA in presence of CA 45º-15

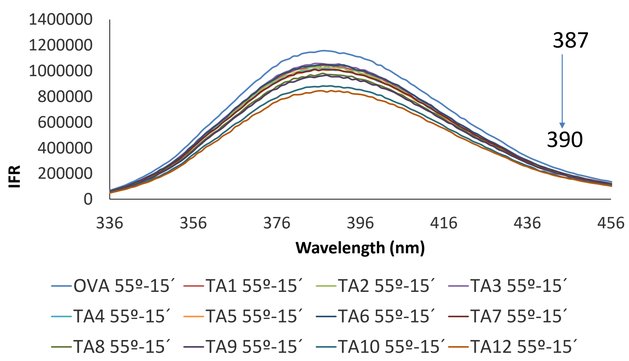



**Figure 5.** OVA+TA 55º-15´ 21-05-18

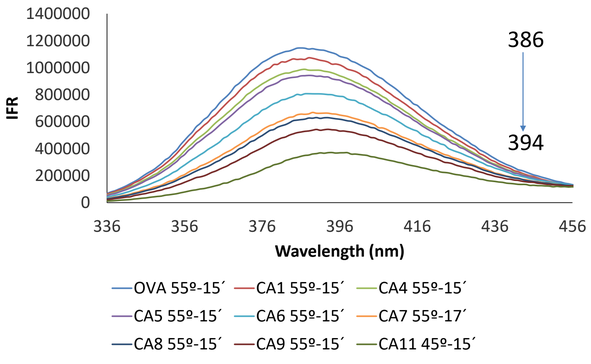



**Figure 6.** OVA+CA 55º-15´ 22-05-18

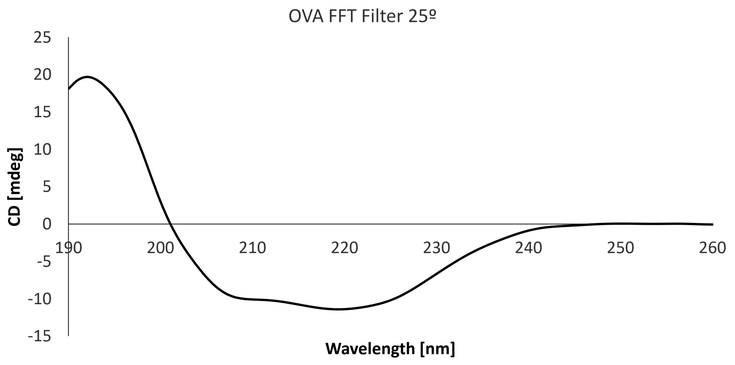



**Figure 7.** OVA in the absence of Phenolic compound C=4.44×10$^4$M

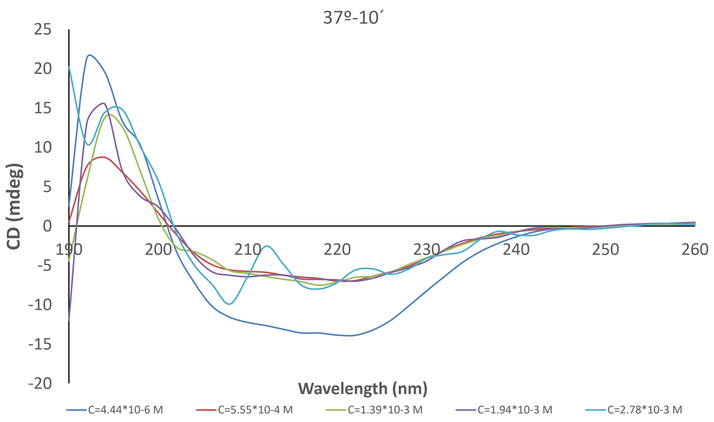



**Figure 8.** CD spectra of OVA (1) and OVA with CA (2-5). [OVA]=4.44µM (1-5), [CA]=0.56 mM (2), [CA]=1.39 mM (3), [CA]=1.94 mM (4) and [CA]=2.78 mM (5).

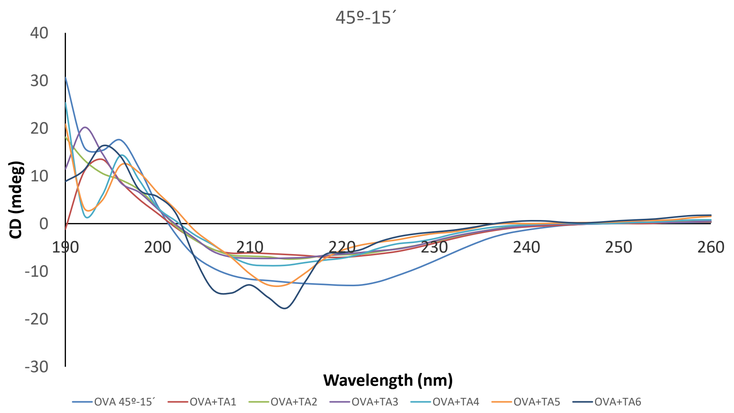



**Figure 9.** CD spectra of OVA (1) and OVA with TA (2-7). [OVA]=4.44µM (1-7), [TA]=0.03 mM (2), [TA]=0,06 mM (3), [TA]=0.09 mM (4), [TA]=0,15 mM (5), [TA]=0.21 mM (6) and [TA]=0.29 mM (7).

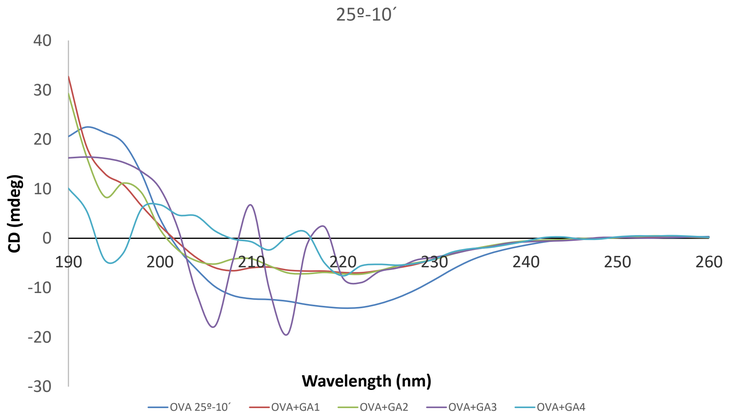



**Figure 10.** CD spectra of OVA (1) and OVA with GA (2-5). [OVA]=4.44µM (1-5), [GA]=0.96 mM (2), [GA]=1.75 mM (3), [GA]=2.65 mM (4) and [GA]=3.99 mM (5).

## CONCLUSIONS

- The interactions between phenolic compounds and OVA result in complexes (phenolics – OVA) where OVA native structure is changed;
- Data from spectroscopic techniques (FTIR, Fluorescence and CD), were combined to show overall changes of OVA structure as a function of environmental conditions;
- The interactions affect epitopes and hence OVA allergenicity;
- The increasing of the temperature and the phenolic compounds concentration changes OVA structure in the complex.

## REFERENCES

1. Ognjenovic, et al. (2014). *Food Chem.*, *164(2014)*, 36–43.
2. Ozdal, T., Capanoglu, E., & Altay, F. (2013). *Food Res Internat*., 51(2), 954-970.

## ACKNOWLEDGEMENTS

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