**Effect of phenolic compounds extracted from chestnut (*Castanea sativa* Mill.) industry by-products on antibiotic resistant bacteria**

**Vanessa Silva1, Gilberto Igrejas2,3,4, Virgílio Falco5, Joana Amaral6,7, Carmen Torres8, Patrícia Poeta1,4**

1Department of Veterinary Sciences, University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal;

2Department of Genetics and Biotechnology, University of Trás-os-Montes and Alto Douro, Vila Real, Portugal;

3Functional Genomics and Proteomics Unit, University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal;

4Research Unit on Applied Molecular Biosciences (UCIBIO-REQUIMTE), University Nova of Lisboa, Lisboa, Caparica, Portugal;

5Centro de Química-Vila Real (CQ-VR), University of Trás-os-Montes and Alto Douro, Vila Real, Portugal;

6ESTiG, Polytechnic Institute of Bragança, Portugal;

7REQUIMTE-LAQV, Department of Chemical Sciences, Pharmacy Faculty, University of Porto, Portugal;

8Área de Bioquímica y Biología Molecular, Universidad de La Rioja, Logroño, La Rioja, Spain.

**Background:** In the last years, antibiotic resistance has become a serious threat to human and animal health since a large number of microorganisms have developed resistance to the drugs commonly used. Several natural compounds have been getting increased attention as alternatives to many drugs. Phenolic compounds are secondary metabolites which exhibit several properties, such as, antimicrobial, antioxidant, anti-inflammatory, antimutagentic and cardioprotective. Thus, this study aims to investigate the antibacterial properties of the phenolic compounds extracted from the chestnut (*Castanea sativa* Mill.) industry by-products against antibiotic resistant bacteria.

**Materials/Methods:** The extraction of phenolic compounds from the shell, inner shell and bur of the chestnut of the ‘Longal’ variety, as well as from the leaves of chestnut tree, was performed with 100% ethanol. The extracts were freeze-dried to powder and the obtained residue was redissolved in dimethyl sulfoxide to a final concentration of 100, 75, 50, 25 and 10 mg/mL. The evaluation of phenolic compounds in the extracts was performed by HPLC-DAD. A disk diffusion method was used to assay the extracted phenolic compounds for bactericidal activity against 4 gram-positive bacteria: *E. faecalis* vanB2-C3735, *E. faecium* vanA-C2302, *S. aureus* C5932 (MRSA CC398), *S. epidermidis* C3658 (linezo-R); and 4 gram-negative bacteria: *E. coli* C999 (CTX-M-15), *S. enteritidis* C4220, *K. pneumoniae* C1370 (CTX-M-15), *P. aeruginosa* C4660 (VIM-2).

**Results:** *S. aureus* and *S. epidermidis* showed susceptibility to all tested extracts. The inner shell’s extract exhibited the highest antimicrobial capacity since all gram-positive and 2 gram-negative bacteria were inhibited by this extract. The shell, bur and the leaves extracts had inhibitory effect in only 3 bacteria each. None of the extracts had inhibitory effect on *E. coli* or *S. enteritidis*.

All the bacterial strains dem-

onstrated some degree of sensitivity to

All the bacterial strains dem-

onstrated some degree of sensitivity toAll the bacterial strains dem-

onstrated some degree of sensitivity to

All the bacterial strains dem-

onstrated some degree of sensitivity to

All the bacterial strains dem-

onstrated some degree of sensitivity to

All the bacterial strains dem-

onstrated some degree of sensitivity to

**Conclusion**: The phenolic compounds extracted from chestnut industry by-products, particularly from the inner shell showed some antimicrobial effect against 6 out of the 8 antibiotic resistant bacteria tested. The industry by-products are a cheap source of polyphenols which may be a new alternative to antibiotics.