TITLE: MOLECULAR DOCKING OF SdiA PROTEIN FROM Enterohemorrhagic *Escherichia coli* WITH POTENTIAL QUORUM SENSING INHIBITOR PLANT COMPOUNDS

AUTHORS: CARNEIRO, D.G.[1]; ALMEIDA, F.A.[1]; VARGAS, E.L.G.[1]; PINTO, U.M.[2]; VANETTI, M.C.D.[1]

INSTITUTION: [1]Department of Microbiology, Laboratory of Food Microbiology, Universidade Federal de Viçosa, Viçosa, MG, Brazil; [2]Food Research Center, Department of Food and Experimental Nutrition, Faculty of Pharmaceutical Sciences, Universidade de São Paulo, São Paulo, SP, Brazil.

ABSTRACT:
Enterohemorrhagic *Escherichia coli* (EHEC) is an important foodborne pathogen. In addition to diarrhea, EHEC can cause hemorrhagic colitis and, sometimes, haemolytic uremic syndrome, which can be fatal. In this pathogen, the expression of invasion genes and biofilm formation can be regulated by quorum sensing (QS), a mechanism of cellular communication. The *Escherichia* genus does not encode an acyl homoserine lactone (AHL) synthase, one of the QS signaling molecules. However, it encodes SdiA, a LuxR homolog protein capable of detecting and responding to exogenous AHL molecules. Plant phenolic compounds have been shown to inhibit QS phenotypes, potentially via interference with LuxR homologues. Thus, the aim of this work was to perform molecular docking of EHEC SdiA protein with plant compounds classified as methoxy phenolics such as shogaol, isoshogaol and gingerol with different carbon side chains as well as with AHLs and the QS inhibitors knowns as furanones. The CLC Drug Discovery Workbench 3.0.2 software was used for the molecular docking of the SdiA protein from EHEC, available in the Protein Data Bank database (PDB: 4Y13), and the tested compounds. Among the evaluated AHLs, the N-dodecanoyl-DL-homoserine lactone (C12-AHL) was the one with best binding score with the SdiA, -73.84; and among the analyzed phenolic compounds, [6]-shogaol was the one with the best binding score, -69.14. The other compounds that also presented high binding score were [6]-gingerol (-67.14), [6]-isoshogaol (-63.55) and [8]-shogaol (-63.10), respectively. All of these compounds had better binding scores than 4-bromo-5-(bromomethylene)-3-dodecyl-2(5H)-furanone, which had the best score (-61.53) among the evaluated furanones. The docking results indicated that methoxy phenolic compounds could able to bind to EHEC SdiA protein, suggesting their potential as QS inhibitors. Moreover, these results can direct studies for the identification of more efficient compounds in inhibiting QS regulated phenotypes in EHEC.

Keywords: inhibitors, methoxy phenol, EHEC, quorum sensing, quorum quenching.

Development Agency: CNPq, CAPES, FAPEMIG, UFV and the CLC bio of the QIAGEN Company by license of the CLC Drug Discovery Workbench 3.0.2 software.