

Food safety and Hygiene

September 06-08, 2018 | Edinburgh, Scotland

Explore the deactivation effects of slightly acidic and basic electrolyzed water on food pathogen-*E. coli* by proteomic approach

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Neutral electrolyzed water including slightly acidic electrolyzed water (SAEW) and slightly basic electrolyzed water (SBEW), considered as high-performance bactericide are increasingly applied in the food industry recently. The SAEW, SBEW and NaOCl solution were treated with *E. coli*. The bacterial protein was extracted and applied in the SDS-PAGE analysis, then differential protein was identified by tandem mass spectrometry coupled with bioinformatics. Meanwhile, dehydrogenase activity, and protein, intracellular potassium and DNA leakages were analysed to evaluate bacterial damage status. The minimum inhibitory concentration was 30 ppm ACC for both SAEW and SBEW. The predominate chlorine species were hypochlorous acid and hypochlorite ion for SAEW and SBEW, respectively. The most severe leakages of DNA, protein

and potassium as well as the lowest dehydrogenase activity for *E. coli* was found by 60 ppm SAEW treatment. The numbers of protein identification by tandem mass spectrometry were more than 80. They were responsible for energy metabolism, protein synthesis related enzymes, outer membrane proteins, chaperone proteins and protein for amino acid synthesis. This study demonstrated that SAEW and SBEW could destroy the outer membrane of *E. coli*. SAEW may also disturb the energy metabolism and protein synthesis system. The chaperone protein, glutathione and some amino acids were up-regulated to protect themselves against SAEW. This study demonstrates the exact deactivation mechanism of SAEW and SBEW on *E. coli*.

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