A management system to control food allergen related hazards should be established and implemented in a company specific setting. Currently, research on food allergens typically focuses on analytical or medical aspects. In the framework of a HACCP approach however, it is absolutely necessary to gain more insight in the behavior of allergens during processing in an industrial setting, in order to evaluate risks linked to cross contamination in production sites via carry-over or via contact materials. A typical case example is related to the re-use of washing water used in the vegetable processing industry. This industry is facing challenges in reducing water volumes and therefore re-use of water is commonly applied. The risk of carry-over of allergenic proteins from for example celery to the water and from the water to other vegetables is however, present and should be evaluated. Celery is an important food allergen in Europe and is an frequently present as an ingredient in processed vegetables. In this study, the carry-over of allergenic proteins via washing water is evaluated.

First, the total protein content in industrial washing waters was measured via Kjeldahl analysis. The highest protein content was found in the washing water of soup vegetables (337 µg protein/ml), followed by the washing water of grated carrots, celery and leek. The washing water of lettuce only contained 10 – 20 µg protein/ml.

In a next step, different solutions with the specific indicator allergen (lysozyme) were made in which fresh-cut vegetables were washed. After washing, lysosome content of the vegetables was determined using a specific and sensitive chromatographic method. The carry-over of lysozyme from the washing water to leek and lettuce was characterized by a Langmuir adsorption isotherm reaching a plateau at protein concentrations higher than 1000 µg/ml. The carry-over on grated carrots showed a linear profile as function of the protein concentration.

A deterministic assessment was made regarding the risk of the carry-over of allergenic proteins via washing water in the case of celery allergens. Assuming a maximum protein concentration in the washing water of 340 ppm celery protein present in the water, it was
shown that in a 50 g portion of lettuce, leek and carrots, respectively, 12.5 mg, 10 mg and 25 mg of celery protein is potentially present, which is well above the minimal reported threshold dose of 7 mg of celery protein reported in literature to trigger allergic reactions in celery allergic patients.

Thus it was concluded that allergic proteins can be transferred via washing water to vegetables in a next production batch and pose a risk towards allergic consumers. The developed methodology can be applied on industrial scale to measure the carry-over and to validate designed preventive measures in the framework of allergen management.