



# Identification of selective biomarkers of chlorine gas exposure



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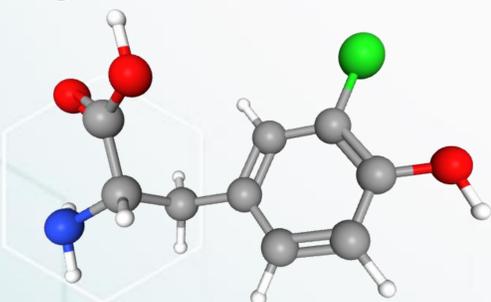


## Objectives

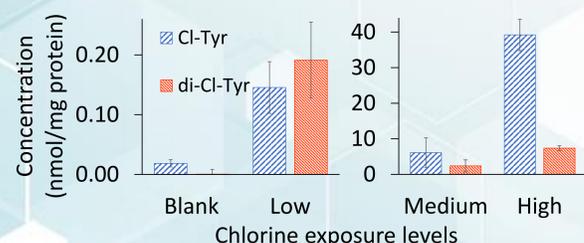
- To find unambiguous biomarkers of chlorine gas exposure
- Applying high resolution MS analysis to identify site-specific chlorinated peptides

## Background

Chlorine is a widely available toxic industrial chemical, which has also been used as chemical weapon in military conflicts. Because of the wide availability it is difficult to distinguish an attack from background sources of chlorine.



Chlorotyrosine, currently used as biomarker, is not selective, because it is also found in unexposed people.

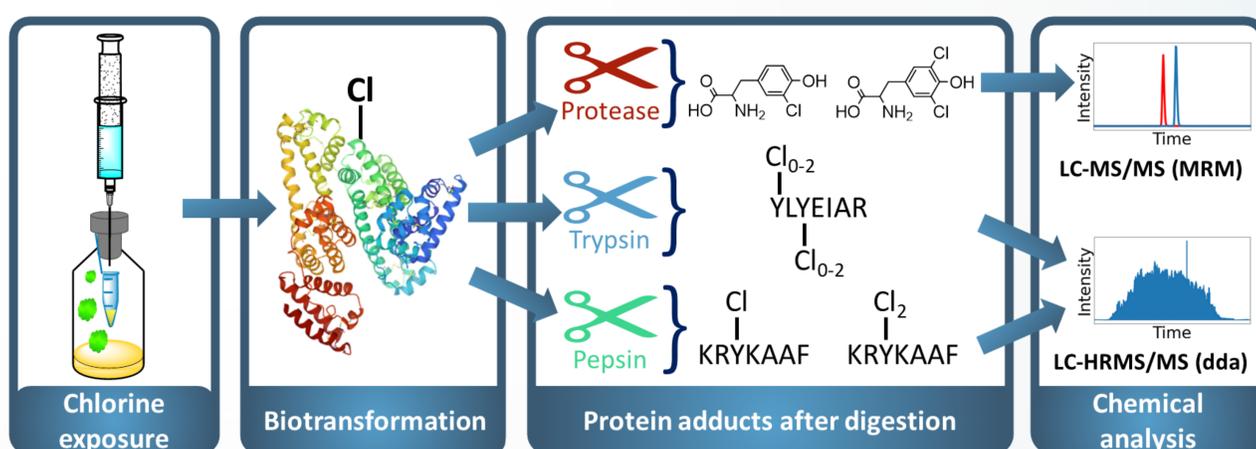


(di-)chlorotyrosine concentration in blanks and after chlorine exposure.

## Research question

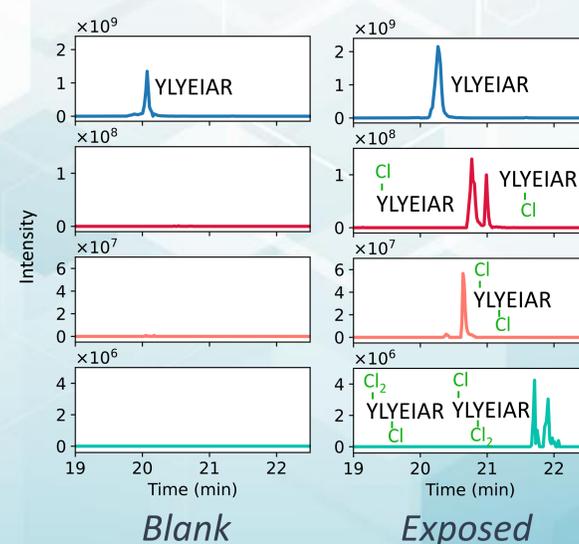
Is it possible to find selective biomarkers that are only formed as a result of chlorine gas exposure?

## Method & Results



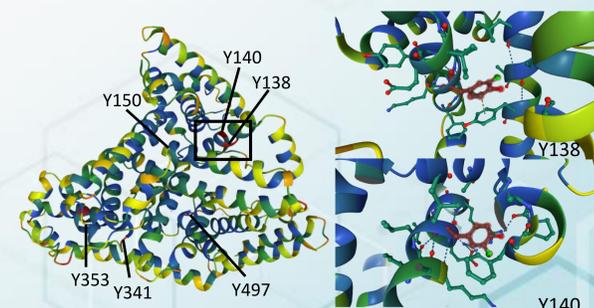
## Main findings

- An LC-HRMS/MS method was developed for the analysis of chlorine biomarkers.
- 50 chlorinated peptides were identified.
- Especially the chlorinated peptide YLYEIAAR is a promising marker for exogenous exposure, because it has multiple degrees of chlorination and was not chlorinated in the blank.



## Conclusion

HRMS analysis of persistent chlorinated peptides could be a valuable technique for the unambiguous forensic verification of chlorine gas exposure.



Positions of chlorinated tyrosine residues in human serum albumin, Y138: Y(Cl)LYEIAAR, Y140: YLY(Cl)EIAAR.

## Future research

- Investigate consistent low-level exposure (swimming, cleaning, etc.)
- Validate in-vitro exposure method in authentic biomedical samples