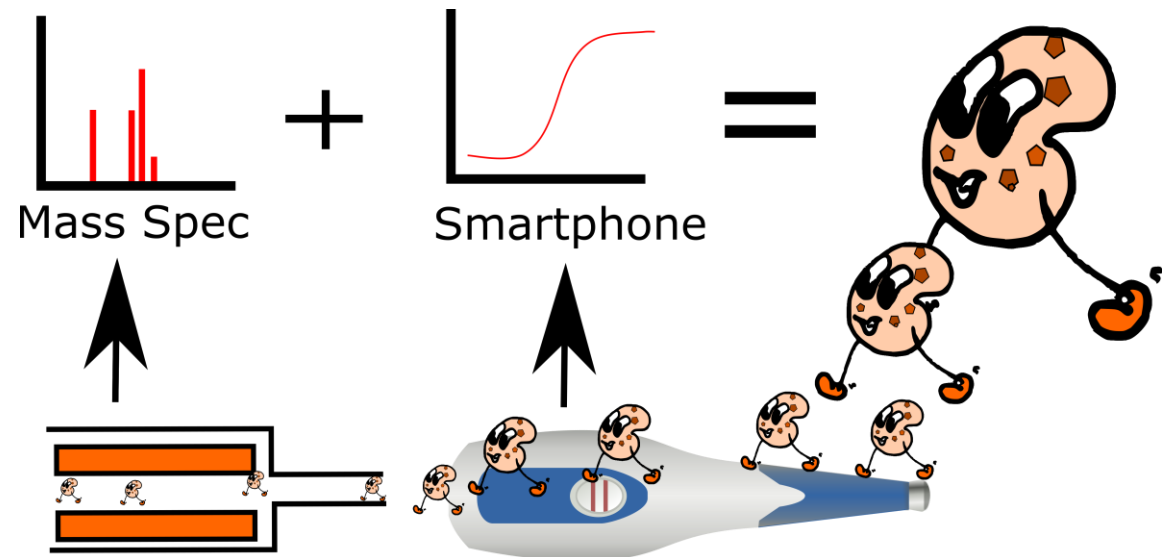


Ensuring allergen-free statement verification through Smartphone-Based RAT tests and Mass Spectrometry.

Jordi Nelis | 29 May 2023



The challenge of removing “May Contain” labels



WHY REMOVE
MAY CONTAIN
LABELS

**GROWING DEMAND
AND BIG MARKET**

Australia is the food
allergy capital of the
world

**MISSING TECH
AND REGULATION**

The PAL era is ending,
we need to be ready

GROW OPPORTUNITY

Loss of sales by not
offering allergen free
products

COST REDUCTION

Recalls can cost \$10-
100 million per case
Source of the
contamination often
remains unknown

The growing demand for allergen free foods

The latest estimates suggest ~10% of Australians have a food allergy

Food allergies are on the rise world-wide and awareness is also increasing.

Forecasts suggest ~8-10% CAGR for the following 10-20 years

Allergen Free Food Market Expected to Reach \$108 Billion By The End Of 2030.

FinancialNewsMedia.com News Commentary

NEWS PROVIDED BY
FinancialNewsMedia.com →
Sep 23, 2021, 08:45 ET

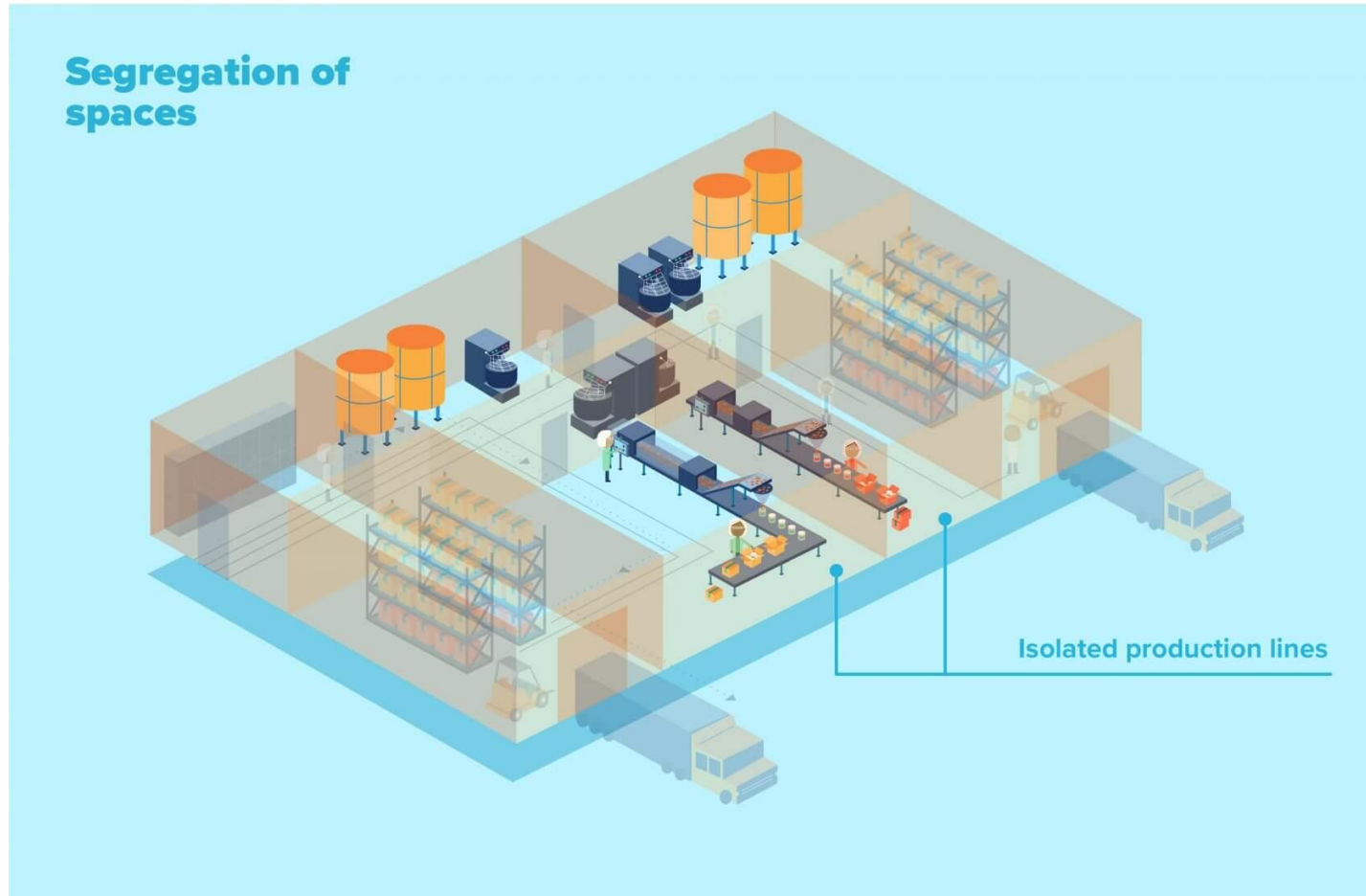
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The solutions

- **Reduce food recall risks for individual players in the supply chain**
- **Reduce the costs of changing processing facilities**

The challenges to enter in this market



Allergen testing is catching up!

analytical
chemistry



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Article

Secure Food-Allergen Determination by Combining Smartphone-Based Raw Image Analyses and Liquid Chromatography–Mass Spectrometry for the Quantification of Proteins Contained in Lateral Flow Assays

Joost L. D. Nelis,* Sarah Moddejongen, Xinlong Guan, Alisha Anderson, Michelle L. Colgrave, and James A. Broadbent



Cite This: *Anal. Chem.* 2022, 94, 17046–17054



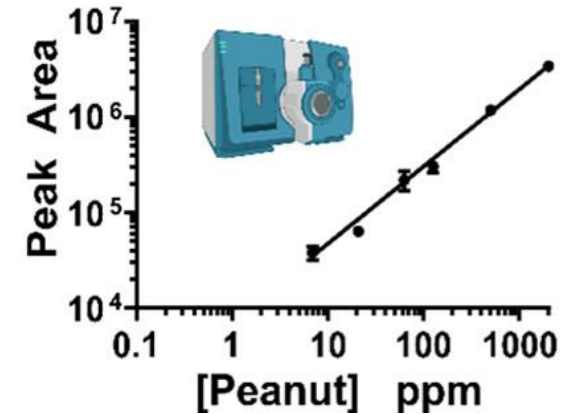
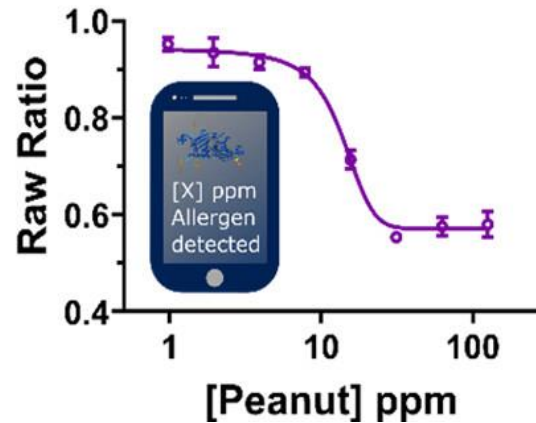
Read Online

About us

- We developed technology that enables streamlined verification of allergen-free products throughout the supply chain.
- Our tech can empower businesses to grow market access and provide safer food to allergenic customers
- Prepare for coming regulations and hit the ground running

THE SOLUTION:
SMART-MS

Improved allergen detection pipeline

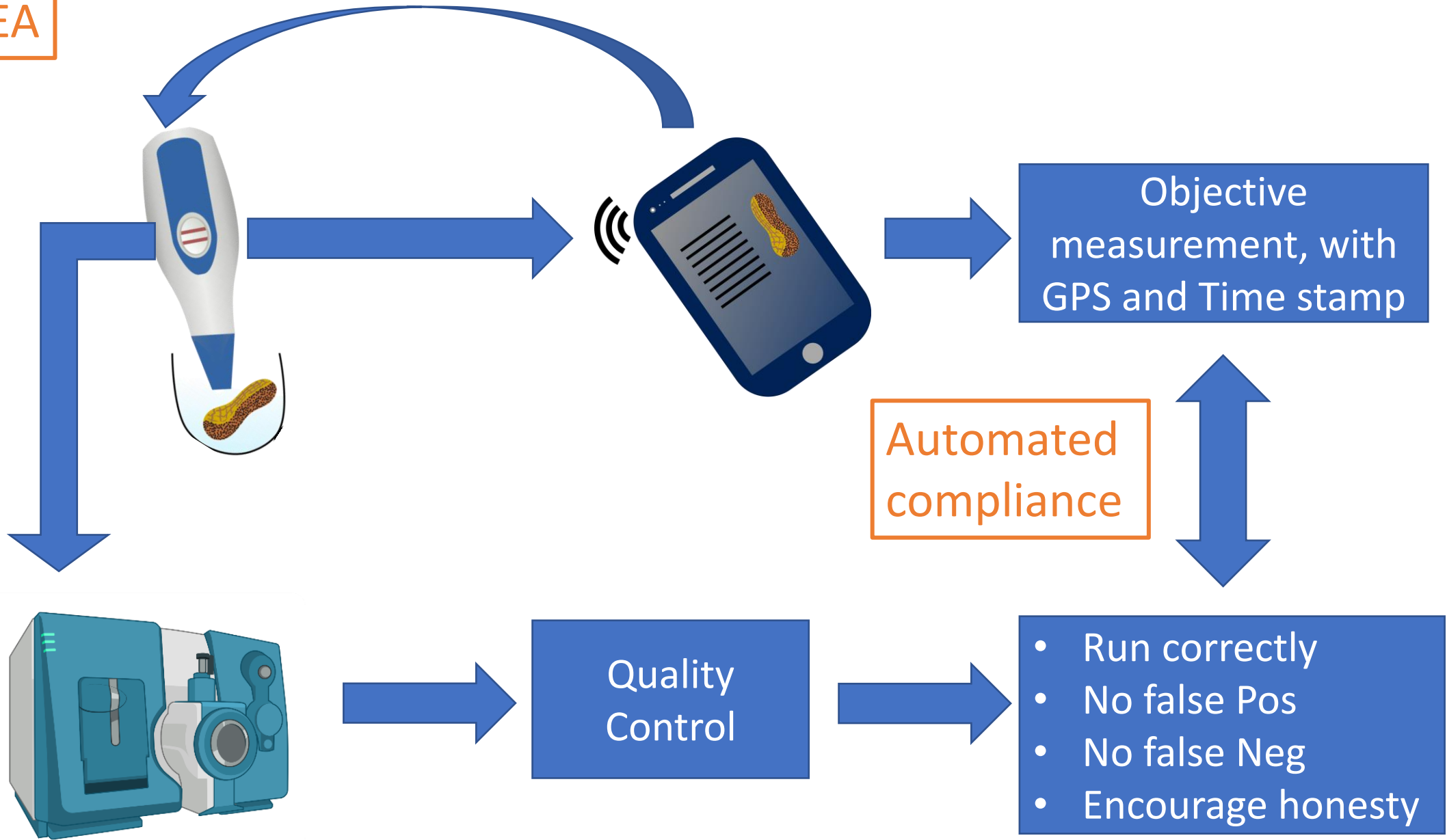


Test for cross-contamination at the miller, processor and retail

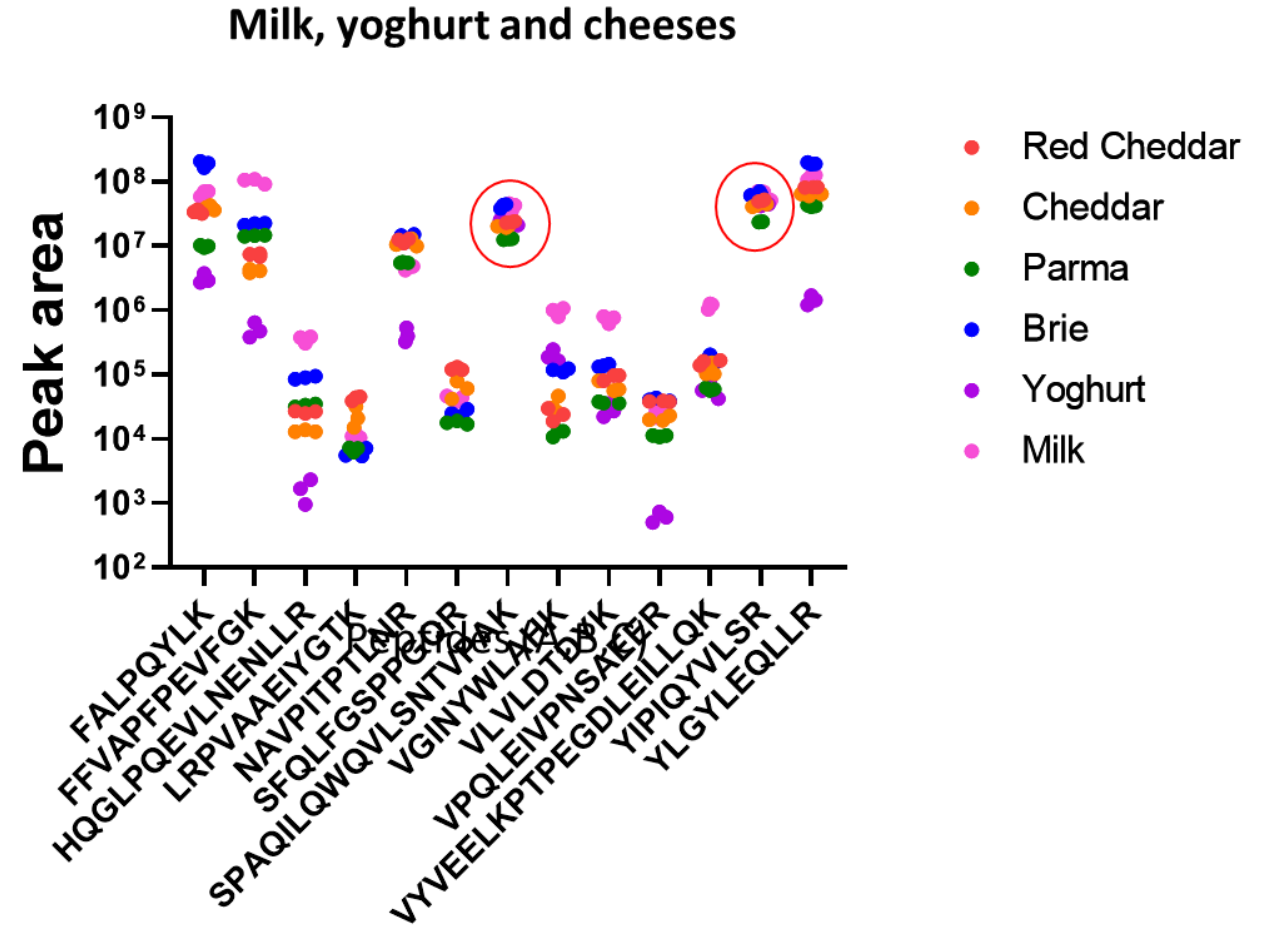
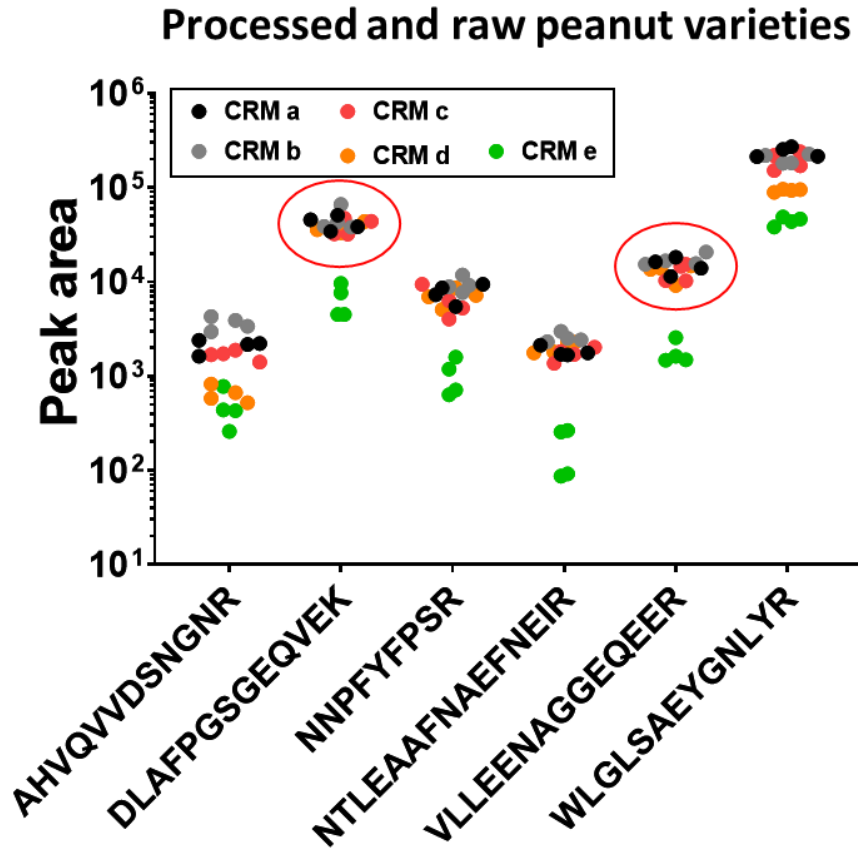
Register and communicate results in the cloud

Apply second testing layer, securing the pipeline is bullet proof

THE IDEA



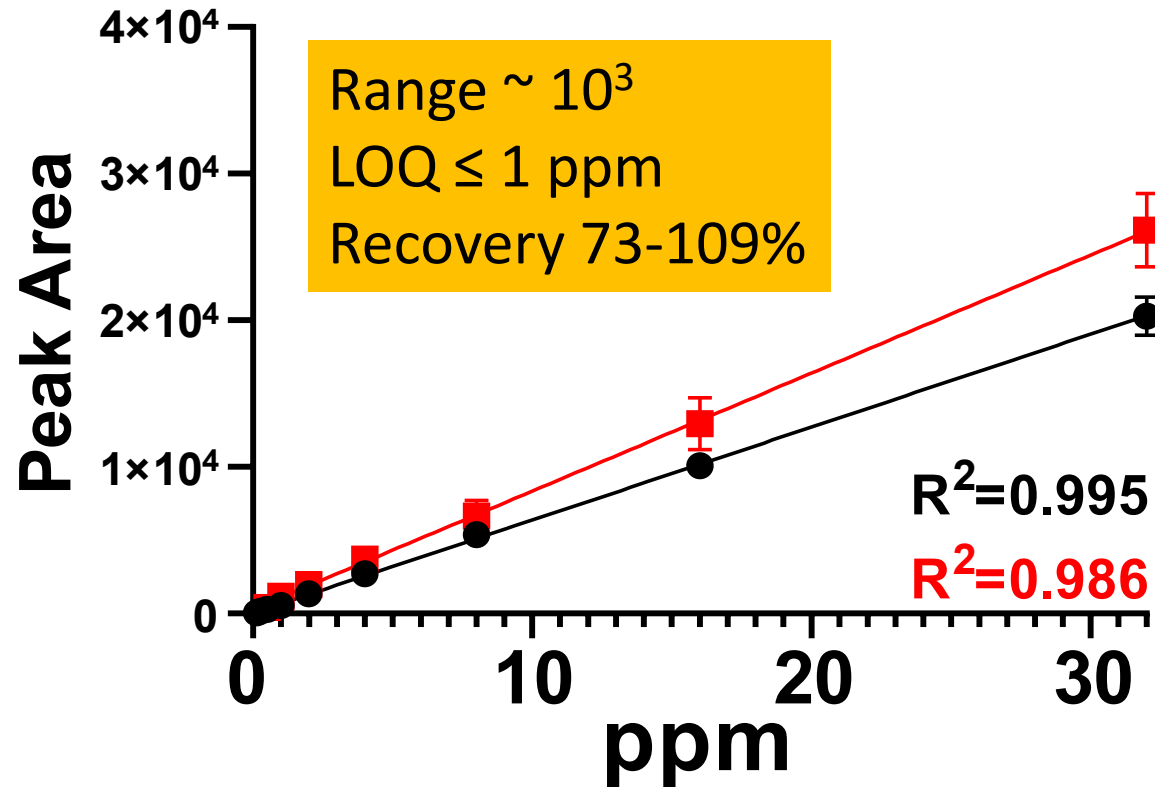
Varieties and food processing effects



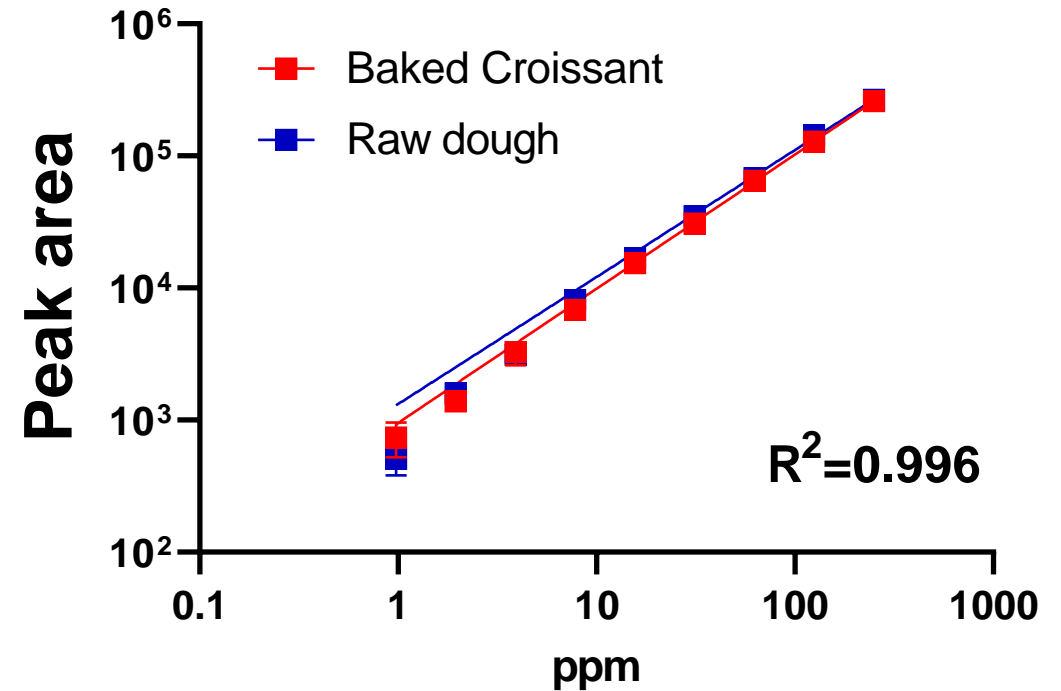
Targeted proteomics: Final assay performance

Multiplex LC-MS assay for all major food allergens

Peanut determination in muffins

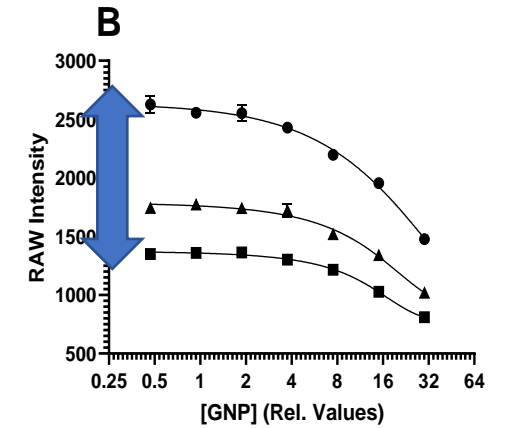
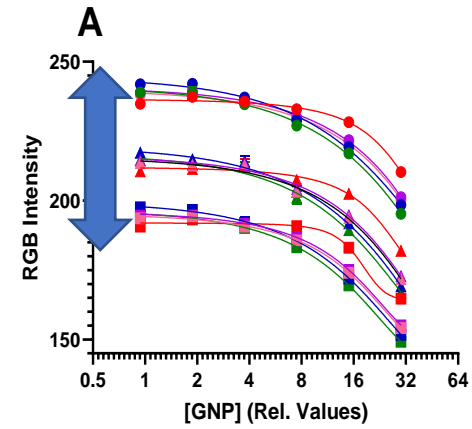
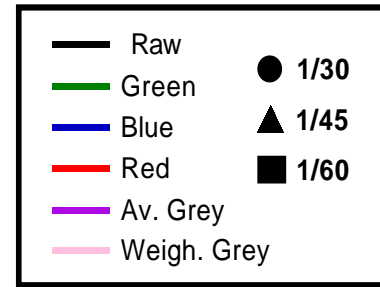


Milk determination in croissants

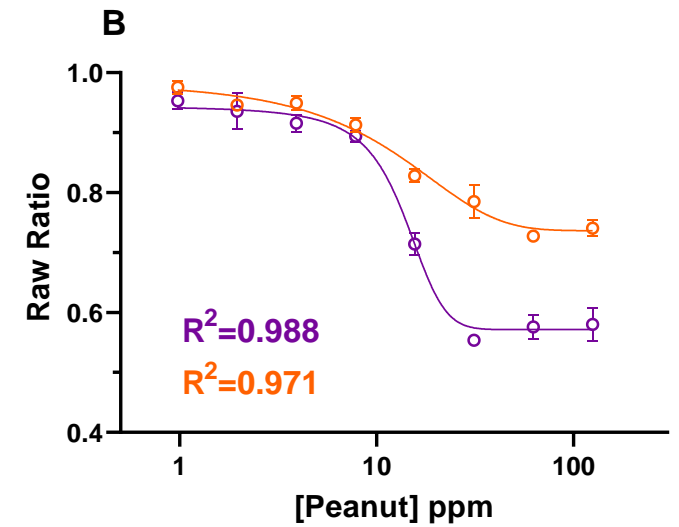
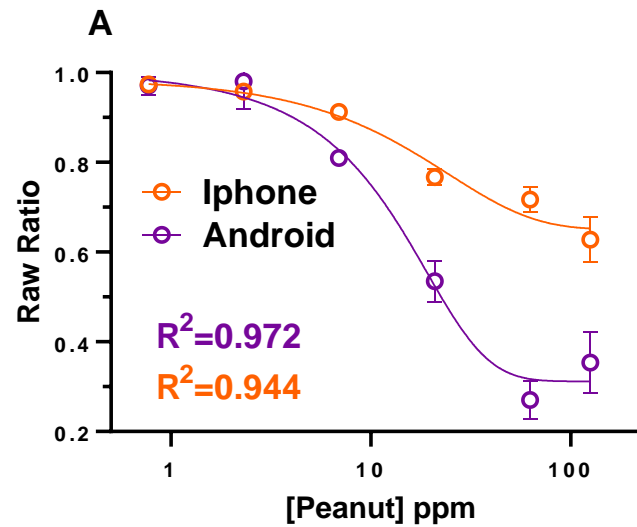
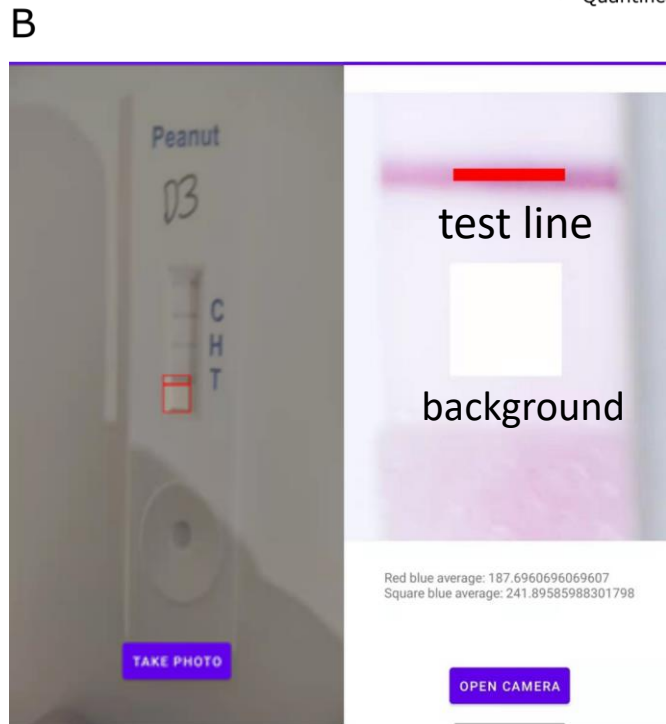
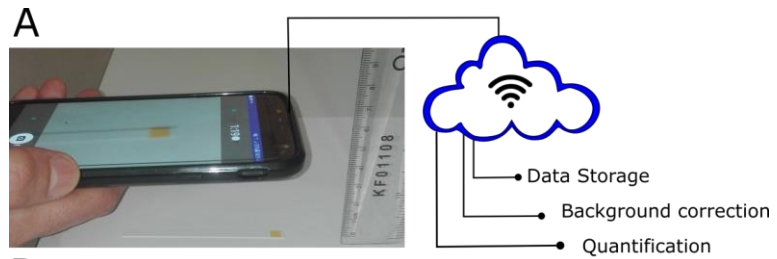


Smartphone based assay

Optimise colour channel and light variation robustness

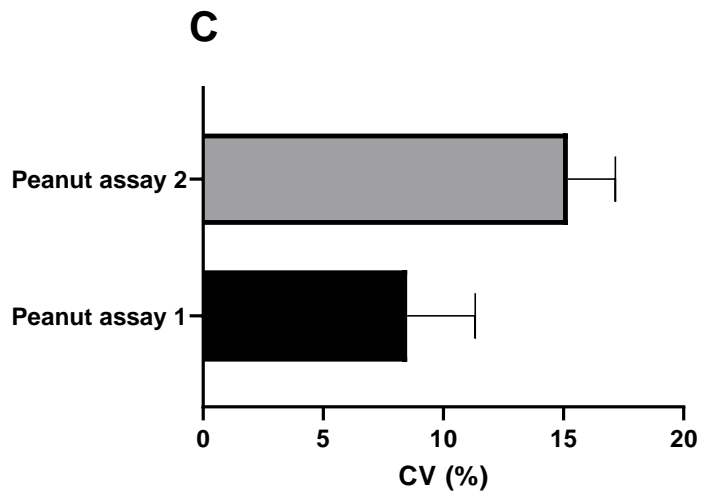
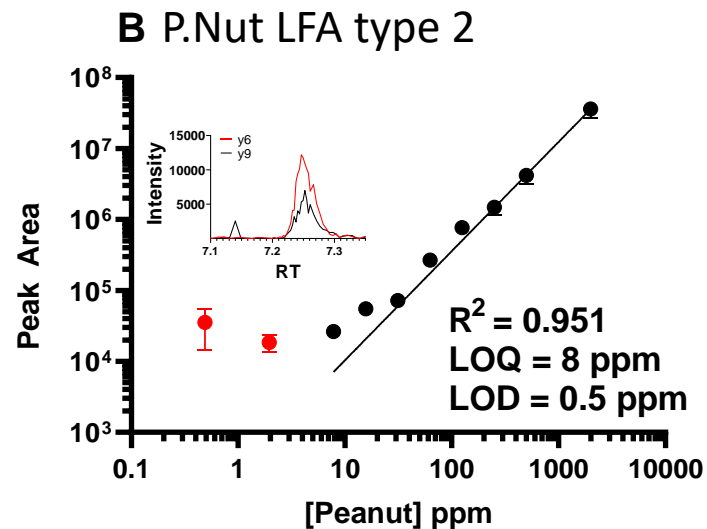
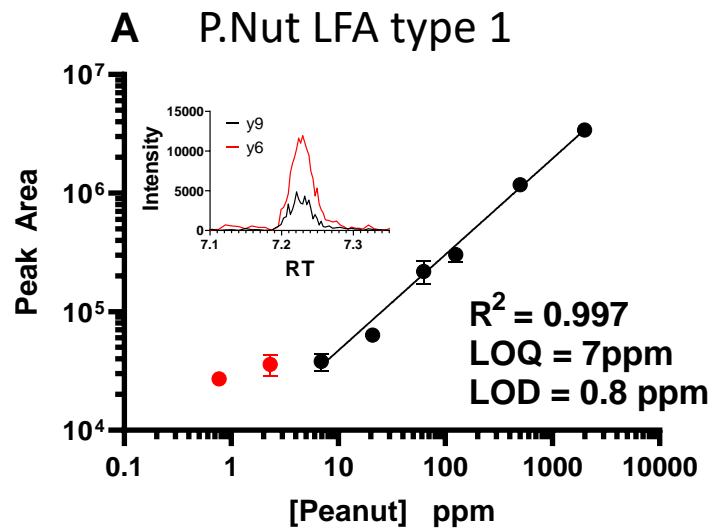


THE SMARTPHONE BASED QUANTIFICATION



Prediction errors of $13\% \pm 11\%$ were reached for the best performing assay

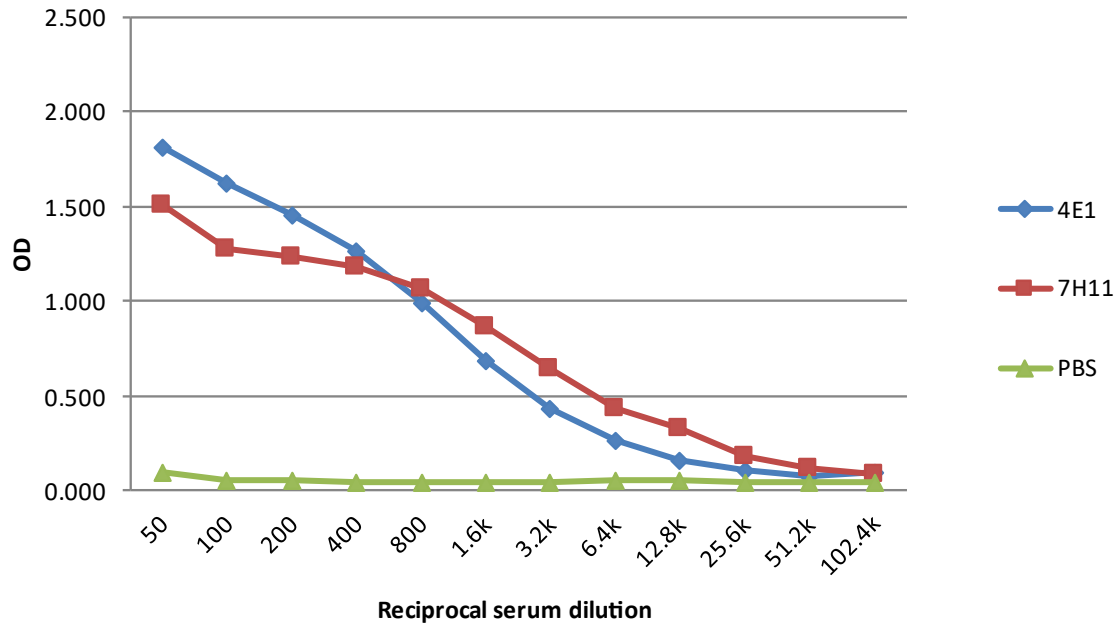
THE QC via LC-MS



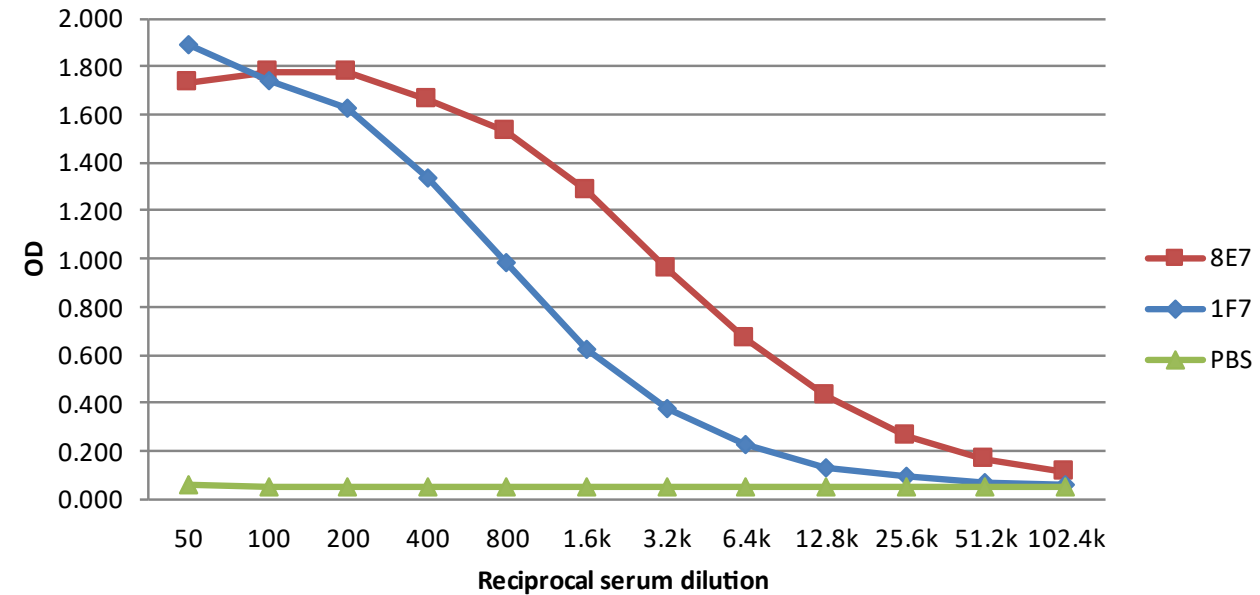
- LC-MS assay shows good performance
- LODs well below LFA LOD, can detect false negatives
- Cross reactivity issue eliminated

Antibody performance

40/22 Supernatant titration on Peptide 2-BSA



39/22 Supernatant titration on Peptide 1-BSA



Conclusion

A rapid and robust LC-MS method for food-allergen quantification

On-site allergen determination with smartphone coupled RATS and follow up LC-MS

Seeking collaboration with industry to further develop the pipeline



Thank you

- Business Units: Agriculture and food & Health and Biosecurity
 - Presenter Name: Dr. Jordi (Joost) Nelis

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