

Acoustically Created “Wall-Less” Test Tubes for single B-Cell Biology in Type 2 Diabetes Related research

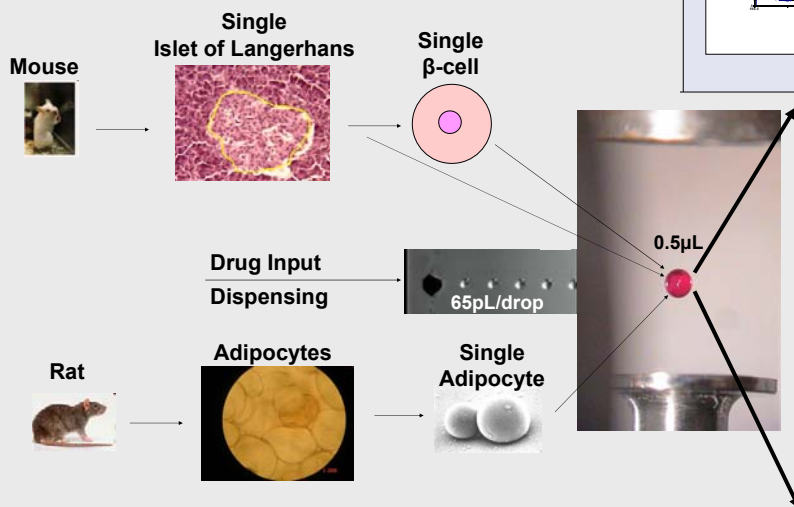
Sandra Lemos¹, Niklas Gustavsson², Eva Degerman³, Sabina Santesson¹, Curt Reimann¹, Lena Eliasson⁴, Patrik Rorsman⁵ and Staffan Nilsson¹

¹Department of Pure and Applied Biochemistry, Lund University, Box 124, 221 00 Lund, Sweden, ²Novozymes Biopharma, Lund, ³Department of Experimental Medical Science, Section for Diabetes, Metabolism and Endocrinology, BMC, Lund University, ⁴Lund University, Islet Cell Exocytosis, Diabetes Center, CRC, Malmö, ⁵Oxford Centre for Diabetes, Endocrinology & Metabolism, UK.

Technology

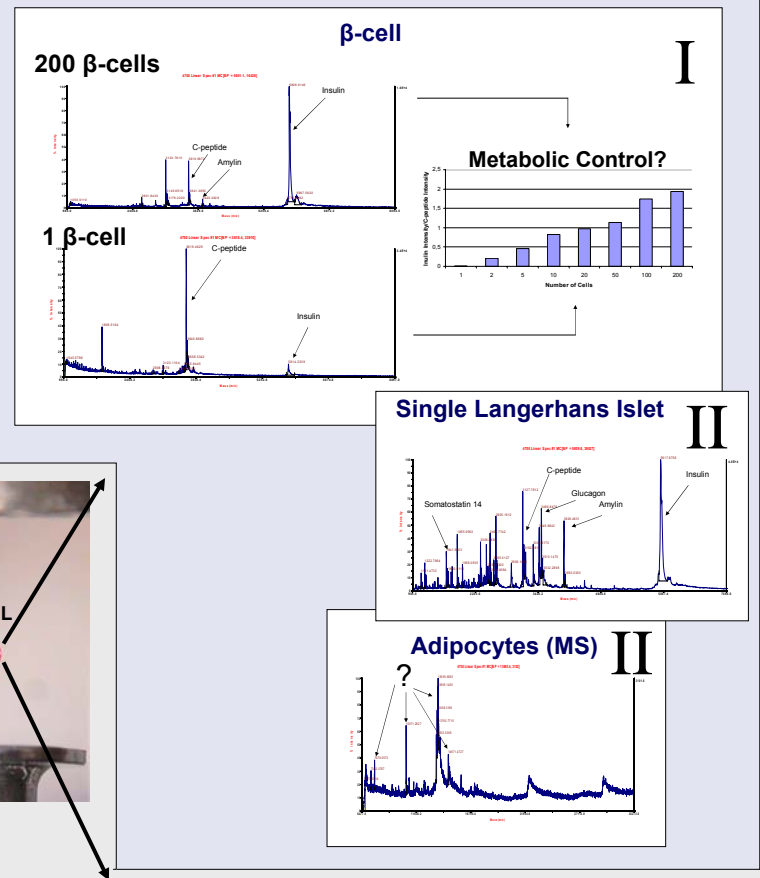
Acoustic levitation:

- No contact with solid walls
 - Increased detection sensitivity
 - No chemical and thermal contamination
- Biological compatibility
- Low reagent and sample consumption
- Easy access to the sample
- Wide range of sample volumes (μL-pL)
- No requirement for specific physical properties of the sample



Results

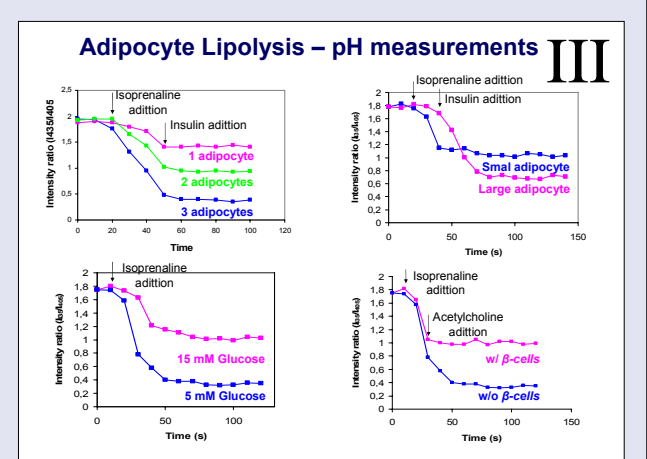
MALDI-TOF-MS



Findings and Conclusions

- Average insulin peak intensity/C-peptide peak intensity ratio varies with the number of β-cells used suggesting a **metabolic control of insulin release by C-peptide (I)**
- Possibility to perform cell-cell communication studies between β-cells and adipocytes at the single-cell level **(III)**
- *Airborne system* interfaced with fluorescence imaging or MALDI-MS at the single/few cell level in real time **(I, II, III)**
- Detection of differences in the response of single Langerhans Islets, single β-cells and single adipocytes **(I, II, III)**
- Easily adaptable to other cell systems and reactions
- Direct use of human cells from biopsies possible

Fluorescence Measurements



References

- Santesson, S.; Degerman, E.; Rorsman, P.; Johansson, T.; Lemos, S.; Nilsson, S. Cell-Cell Communication between Adipocytes and Pancreatic β-Cells in Acoustically Levitated Droplets. *Integrative biology* 2009, 1, 595-601.
- Lemos, S.; Gustavsson, N.; Degerman, E.; Eliasson, L.; Nilsson, S. Interfacing Airborne Cell Chemistry with MALDI-TOF-MS, Lab on a Chip (Submitted manuscript)
- Lemos, S.; Nilsson, S.; Pontén, F.; Reimann, C. On-Demand Mass Spectrometric Interrogation of the Contents of Acoustically Levitated Droplets: Towards Real-Time Monitoring of Chemical Processes in Wall-Less Test Tubes (Manuscript in preparation)