Introduction of MSW²

a handy device specialized for microsampling

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Purposes

• To contribute to facilitating 4Rs for animal studies.
  ✓ Replacement
  ✓ Reduction
  ✓ Refinement
  ✓+ Our Responsibility

Furthermore:

• To ease blood sampling in a small sample size from/for;
  ✓ Neonates & infants
  ✓ seriously sick patients
  ✓ Cohort studies & epidemiological surveys
  ✓ Diagnoses

• Other utilities:
  ✓ Other body fluids (tears, saliva, Interstitial fluid, etc.)
  ✓ Cell culture media
  ✓ Environmental fluids
Better QOL in BA

- To make less complex and to increase productivity of plasma/serum sampling for bioanalysis.
  - Take blood in a haematocrit glass tube (K2EDTA or plain)
    - Plug with wax
    - Place in labeled tube
  - Centrifuge
    - Cut above the blood cell phase using a capillary cutter
    - Transfer plasma sample to an exact volume of microcapillary
  - Put the capillary in a tube or plate for further sample treatments.
- To realise an automation
a facile device for blood microsampling

comprises 2 components,

• Microsample Windmill

• Microsampling wings
Microsampling Wings

- easily held with fingers to sample; essentially blood.
- sterilized by γ ray.
- Designed to have
  - a narrow tubing structure with a hydrophilic inner surface.
  - a ca. 40 µL quantity suction capability utilizing capillary phenomenon.
  - an anticoagulant reagent (EDTA) coated in it for plasma.
  - an small tip like part holding a 10 µL aliquot of the resultant serum or plasma after centrifuging (Ht<50%, applicable for polycythemia blood)
- The tip is easily plucked off with fingertips.
- The removed tips can be treated with MeOH or MeCN with NO volumetric re-measurement.
Features

Microsample Windmill

- Designed
  - a carousel like holder for MS-Wings.
  - to hold 15 or more MS-Wings.
  - to centrifuge them (>2000 x g) for plasma or serum separation.
  - can be stacked and stored with MS-Wings in a deep freezer.
A Micro Sampling protocol with MSW²

γ ray sterilized

Take a Wing out from a sack

Make a small puncture on a finger or palm.

Direct Sampling Into a Wing

Set Wing onto a Windmill
A Micro Sampling protocol with $W^2$ - cont.

Set onto a Pick up a from the
Put it in a (deep) freezer for storage
Set the onto a centrifuge
Centrifuge
Pick up a from the
A Micro Sampling protocol with MS w² - cont.

1. **Plasma or Serum, 10 uL**
   - Pluck off the tip of with fingertips

2. **Put the tip into a tube**
   - Add MeOH/MeCN, IS or Assay buffer

3. **Deproteination & Extraction**
   - For Chromatography

4. **Dilution**
   - For LBA

**quantification!**
Performances

• Method: LC-ESI+MS/MS, ODS
• Model compound: fexofenadine
• Calibration range: 0.1 - 100ng/mL
• Samples:
  • rat whole blood fortified with the compound at 10ng/mL for the precision evaluation.
  • Pooled human plasma fortified with the compound at 10ng/mL for determination accuracy
  • Blood from a volunteer who took Allegra for months.

Result
• Precision: <5.2 %
  for pooled rat blood fortified at 100ng/mL
• Plasma concentrations determined well agreed with the profiles of the product.
A Micro Sampling protocol with MS W²

Summary

SAMPLING
Conclusion

- **MS** can be the first practical microsampling device with a simple manipulation, realizing an accurate quantification in bioanalysis.

- More sampling time-points from a single small animal are possibly set,
  - contributing to reduce the sacrificing number in preclinical studies.

- The sampling can easily be done from capillary blood on a fingertip, palm, heel and etc of patients with a minimal sized puncture in clinical studies and medical practices.
  - A stress and sense of fear upon the sampling can be reduced as well as the small sampling size.
  - Blood sampling even from neonates & infants and patients becomes less difficulty.

- **Other utilities:**
  - Cohort studies & epidemiological surveys,
  - Diagnoses,
  - Other body fluids (tears, saliva, Interstitial fluid, etc.)
  - Cell culture media
  - Environmental fluids
Future plans:


- Evaluation and brush up through field tests with those who are interested in the devices: Please contact me (^_^)ﾉ!
  - More desirable sampling volume, 10μL (Ht<0.5) or 15μL (Ht<0.45) to be decided.

in 2016

- Launch
  - Microwing with EDTA & plain types (If needed Heparinated one added)

From 2017 onwards

- Windmill stacker & rotor (for 10-20)
- Microwing-hyper for 40μL plasma/serum from 80μL blood
- Down sizing (40μL blood)
病は気から
sickness and health start with the mind

医食同源
healthy food a balanced diet leads to a healthy body &
both prevents and cures sickness.

笑門来福
Fortune comes in at the merry door