

# Radio-HPTLC in determination of radioactive metabolites of [<sup>18</sup>F]FDOPA

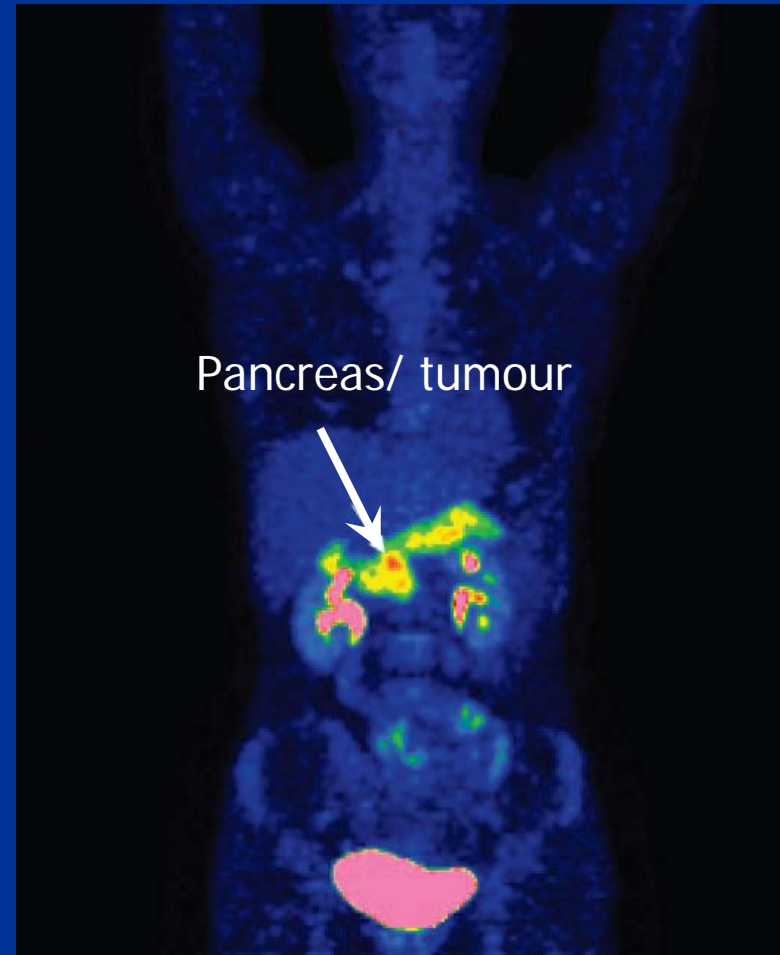
S. Forsback, T. Kalliokoski, O. Eskola,  
K. Mikkola, O. Solin and M. Haaparanta  
Turku PET Centre, University of Turku, Turku, Finland

# Introduction

- **Positron Emission Tomography**, a non-invasive imaging method to study
  - blood flow
  - energy metabolism
  - the function of different neurotransmitters
- Radiolabelled tracer with known metabolism

# [<sup>18</sup>F]FDOPA

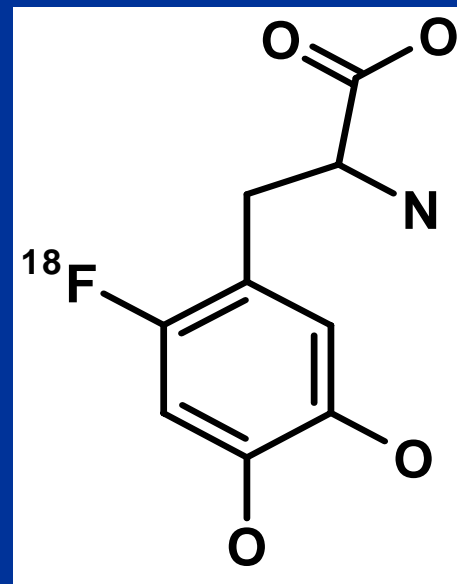
- Analogue of Levodopa
- Tracer for imaging
  - Presynaptic dopaminergic function
  - Parkinson's disease
  - Neuroendocrine tumours
  - Hyperinsulism of infancy
- Metabolism well known in brain, but not in other organs



*Kauhanen et al 2007.*

# [<sup>18</sup>F]FDOPA

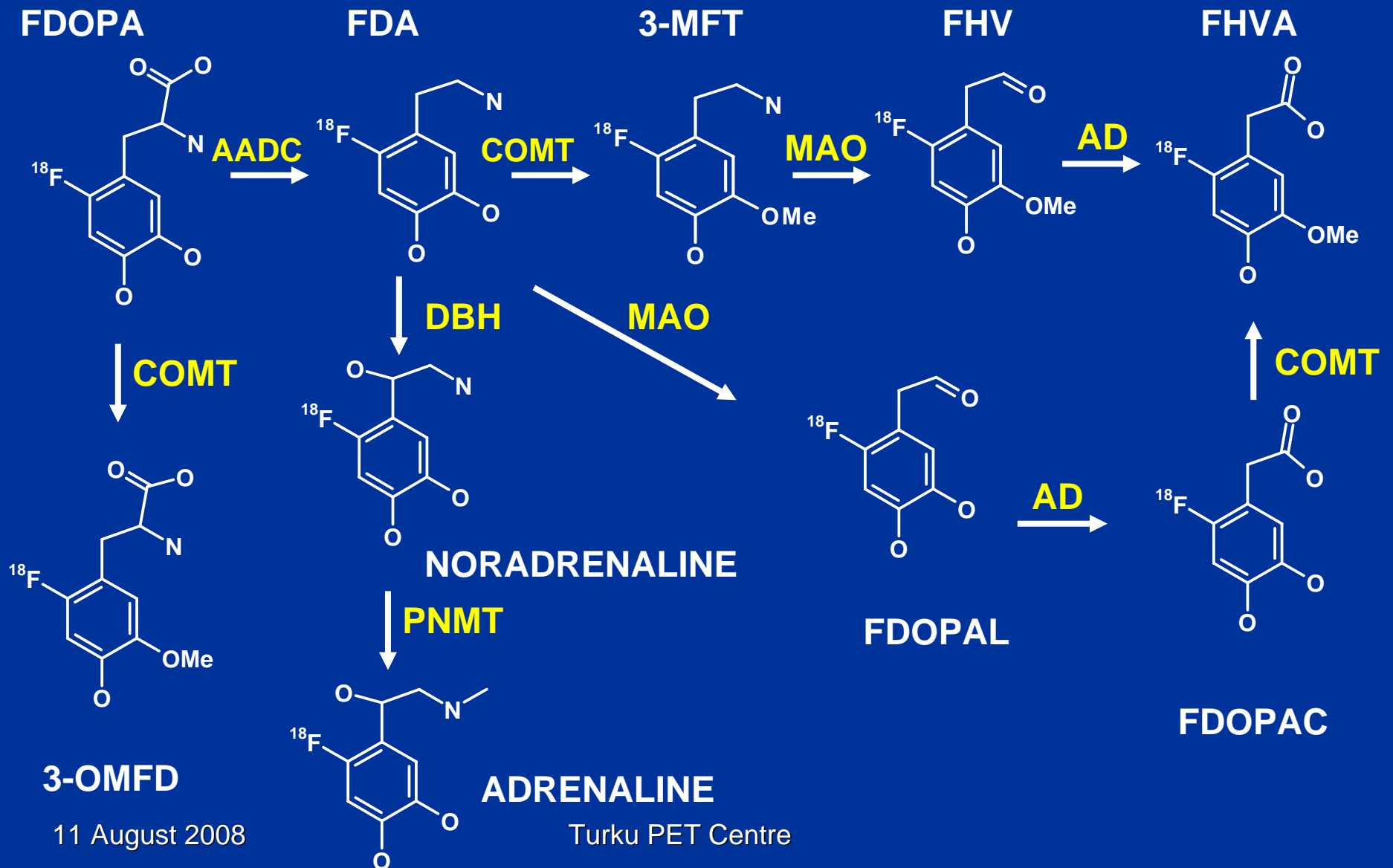
- 6-[<sup>18</sup>F]fluoro-3,4-dihydroxy phenyl alanine
- <sup>18</sup>F; T<sub>1/2</sub> = 109.8 min
- Specific radioactivity  
~4 GBq/micromol



# Aim of the study

- To gain understanding on metabolic pathways of [ $^{18}\text{F}$ ]FDOPA in pancreas, liver, striatum and plasma by modulating the metabolism by enzyme inhibitors:
  - **Carbidopa**, an aromatic L-amino acid decarboxylase (AADC) inhibitor
  - **RO 41-0960**, a catechol-O-methyl transferase (COMT) inhibitor
  - **Clorgyline** and **deprenyl**, monoamine oxidase (MAO) inhibitors

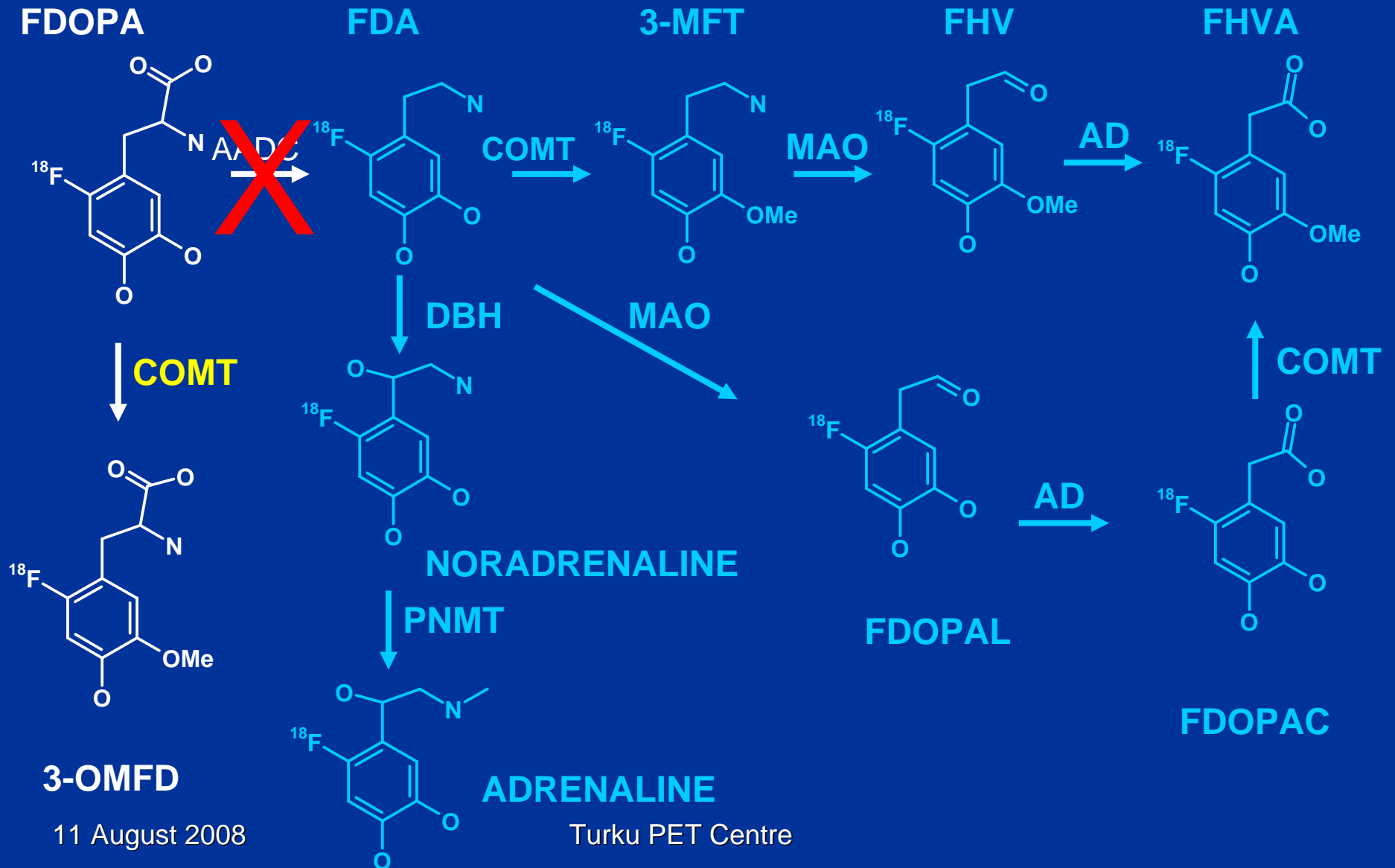
# Metabolism of [<sup>18</sup>F]FDOPA



11 August 2008

Turku PET Centre

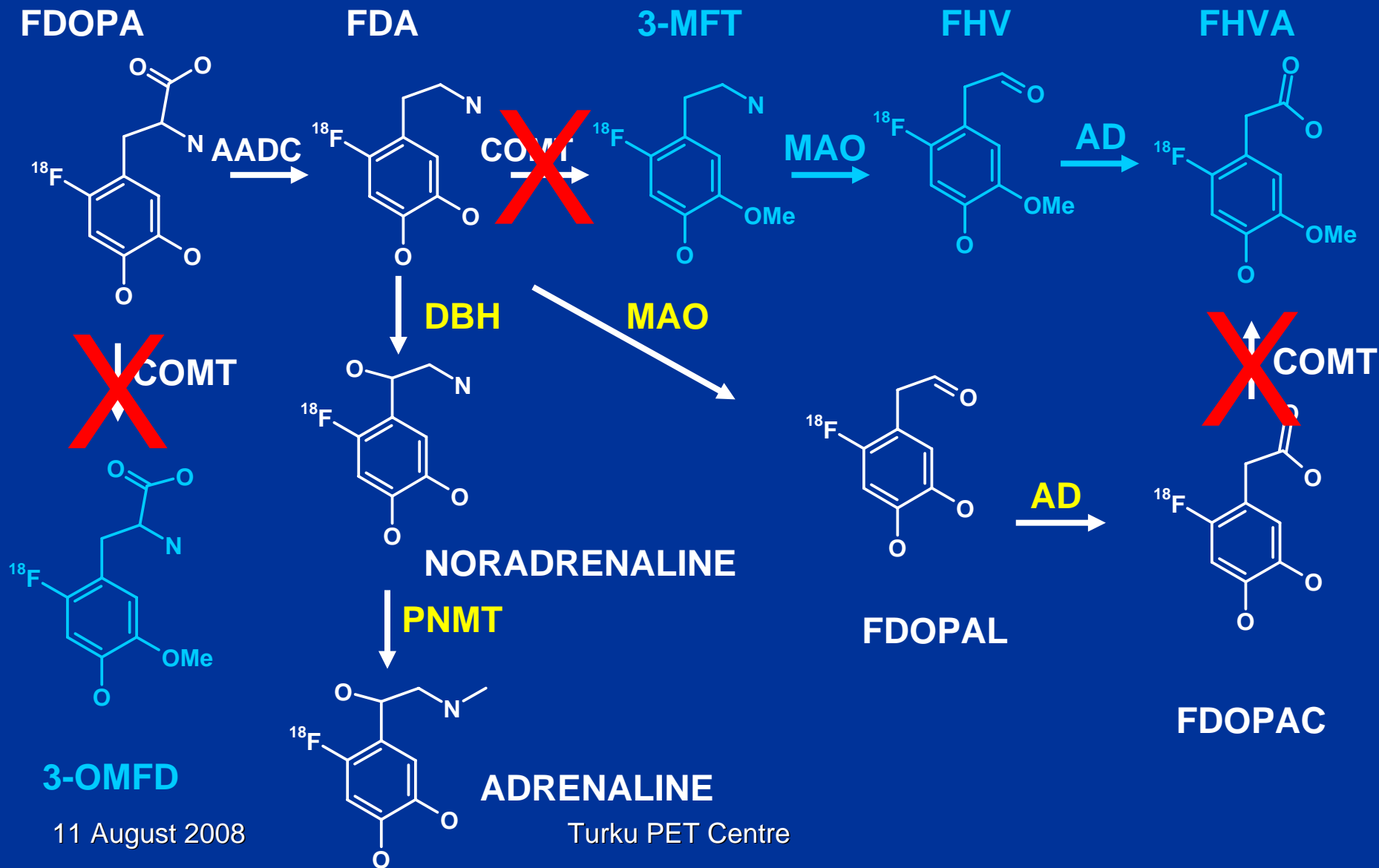
# Cardidopa, AADC inhibitor



11 August 2008

Turku PET Centre

# RO 41-0960, COMT inhibitor

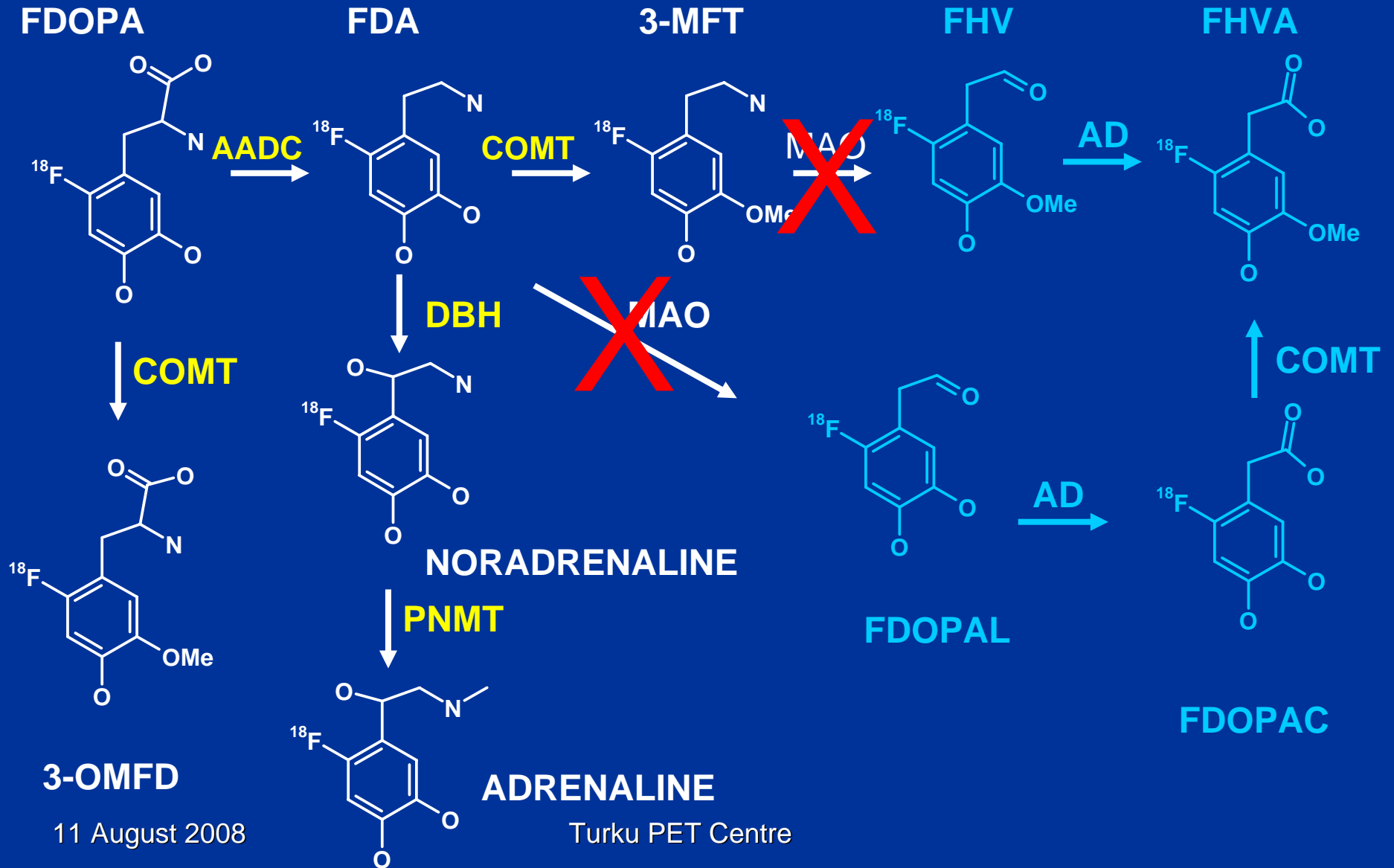


11 August 2008

Turku PET Centre



# Clorgyline and deprenyl, MAO inhibitors



11 August 2008

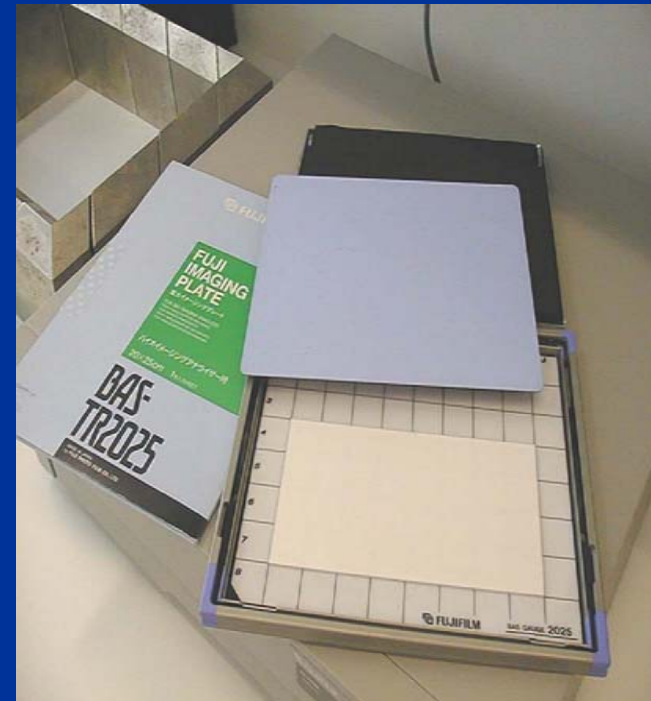
Turku PET Centre

# Methods

- 35 MBq of FDOPA i.v.
- Plasma was deproteinated
- The tissues were homogenized in perchloric acid
- The supernatants were applicated onto HPTLC Silica 60 plates
- Developed in n-BuOH/AcOH/H<sub>2</sub>O (40:10:10)

# Autoradiographic method

- HPTLC-plates were exposed with an imaging plate (IP) for 4 h
- IP: reusable sensor for the detection of ionizing radiation energy stored in photostimulable phosphor crystals

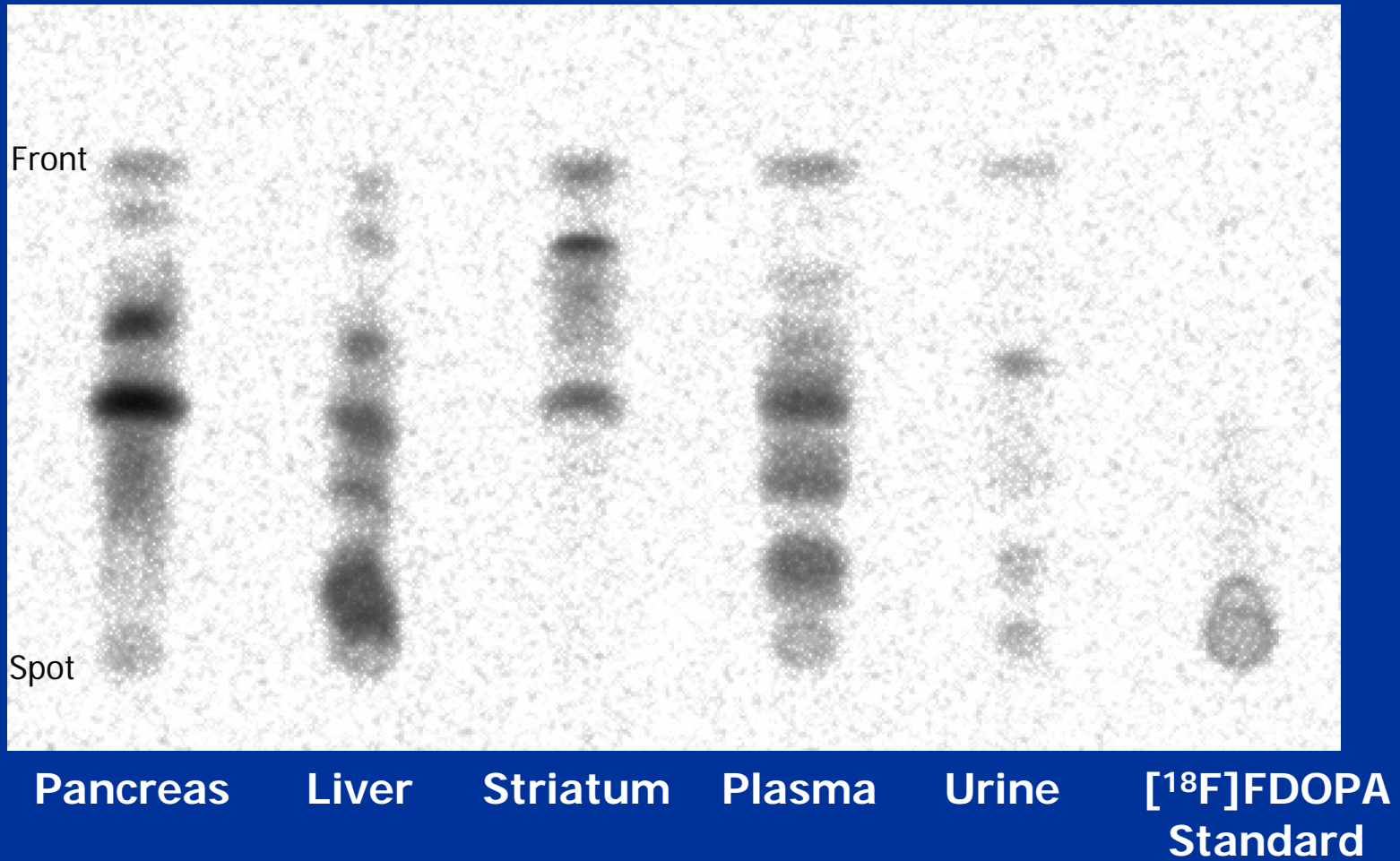


# Autoradiographic method

- The radioactivity was recorded with a phosphoimager (Fuji Film BAS-5000)

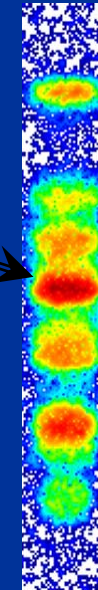
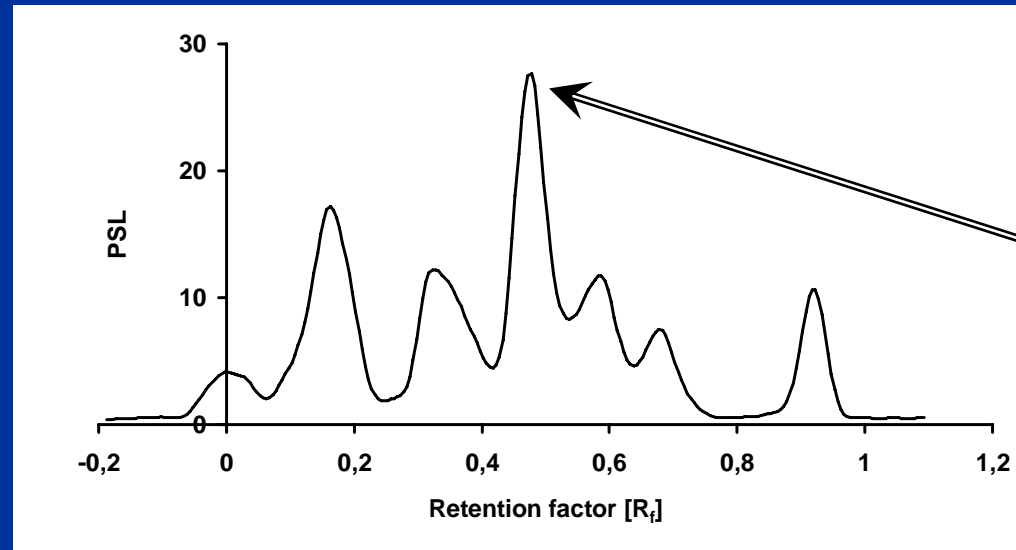


# Results



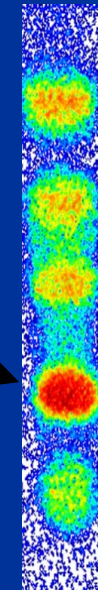
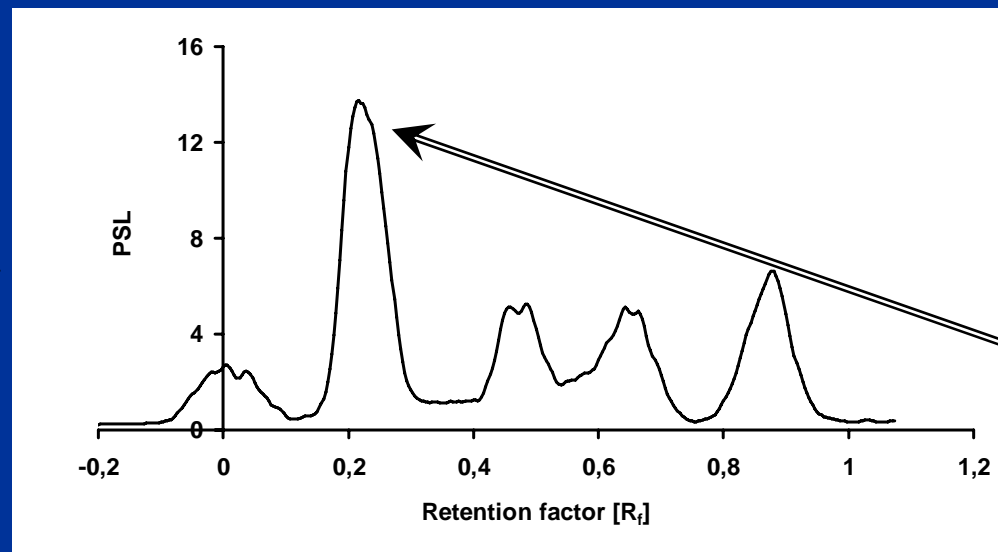
# Results

Plasma with no enzyme inhibitors



3-OMFD

Plasma with COMT and MAO-A inhibitors



FDX-SO<sub>4</sub>

# Conclusions

- Identification of metabolites of [ $^{18}\text{F}$ ]FDOPA challenging
  - Migration on TLC-plates is affected by the sample matrix; the amount (mass) of labelled compounds is minimal
- HPTLC combined with digital autoradiography: fast and sensitive
  - Radio-HPTLC is a superior method for analyzing short-lived radioactive metabolites from multiple biological samples