LIPDOMICS WORKSHOP

LIPID MAPS

Welcome & Introduction

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University of California, San Diego

LIPID MAPS

Lipid Metabolites And Pathways Strategy

GENOMICS

(TRANSCRIPTOMICS)

PROTEOMICS

METABOLOMICS

“LIPIDOMICS”

LIPID MAPS

Lipid Metabolites And Pathways Strategy

GENOMICS

(TRANSCRIPTOMICS)

4 base side chains

PROTEOMICS

20 amino acid side chains

METABOLOMICS

nucleic acids, amino acids, sugars and fats: $>10^5$?

"LIPIDOMICS"

all the fats: $>10^5$?

"Lipidomics Joins the Omics Evolution"
Dennis (2009)
PNAS 106, 2089

LIPID MAPS HYPOTHESIS

A systems biology approach to identify the many thousands of lipid molecular species in cells and their quantitative changes in response to cellular stress and challenge will lead us to new methodologies for monitoring lipid changes, and this in turn will lead to breakthroughs in the understanding and treatment of lipid based diseases.

LIPID MAPS

NIGMS Large Scale Collaborative Grant

"Glue Grant" [NIH U54 GM 69338]

Mouse Macrophage:	RAW cell line & primary cell
Environmental Agonist:	initially LPS, then oxidized LDL
HPLC/Mass Spectrometer:	identify known & new, quantify
Synthesis/Characterize:	new ones, MS quantitative standards
Bioinformatics:	informatics and lipid networks
Website:	LIPID MAPS/Nature Lipidomics Gateway http://www.lipidmaps.org

LIPID MAPS CORES

PI

Edward A. Dennis - *UCSD*

Macrophage Biology

Christopher Glass - *UCSD*

LC/Mass Spec

Robert C. Murphy – *Colorado*

Nicholas Winograd – Penn State

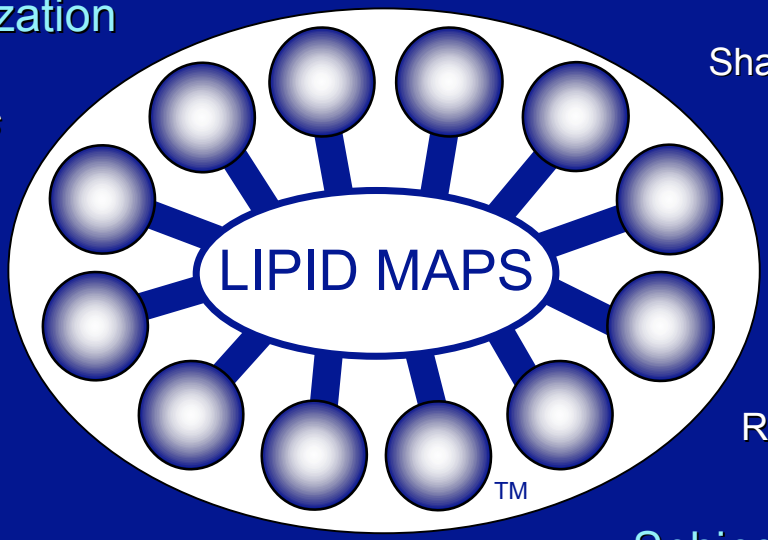
Lipid Synthesis/Characterization

Michael VanNieuwenhze - *UCSD*

Walter Shaw - *Avanti Polar Lipids*

Bioinformatics

Shankar Subramaniam - *UCSD*



Fatty Acyls/Eicosanoids

Edward A. Dennis - UCSD

Glycerolipids

Robert C. Murphy - *Colorado*

Glycerophospholipids

H. Alex Brown - *Vanderbilt*

Sphingolipids/Gangliosides

Alfred H. Merrill - *Georgia Tech*

Sterols

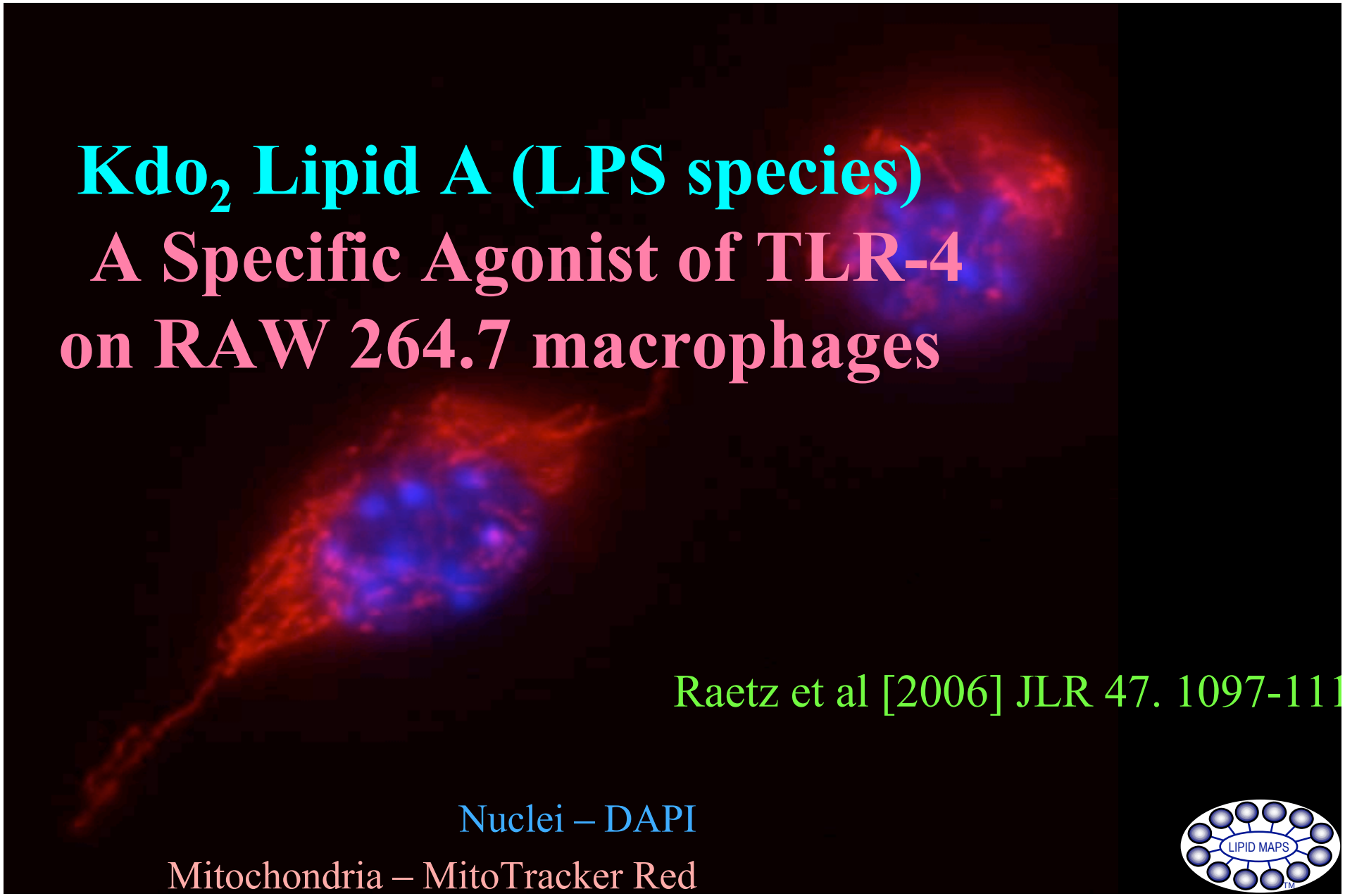
David W. Russell - *UTSW*

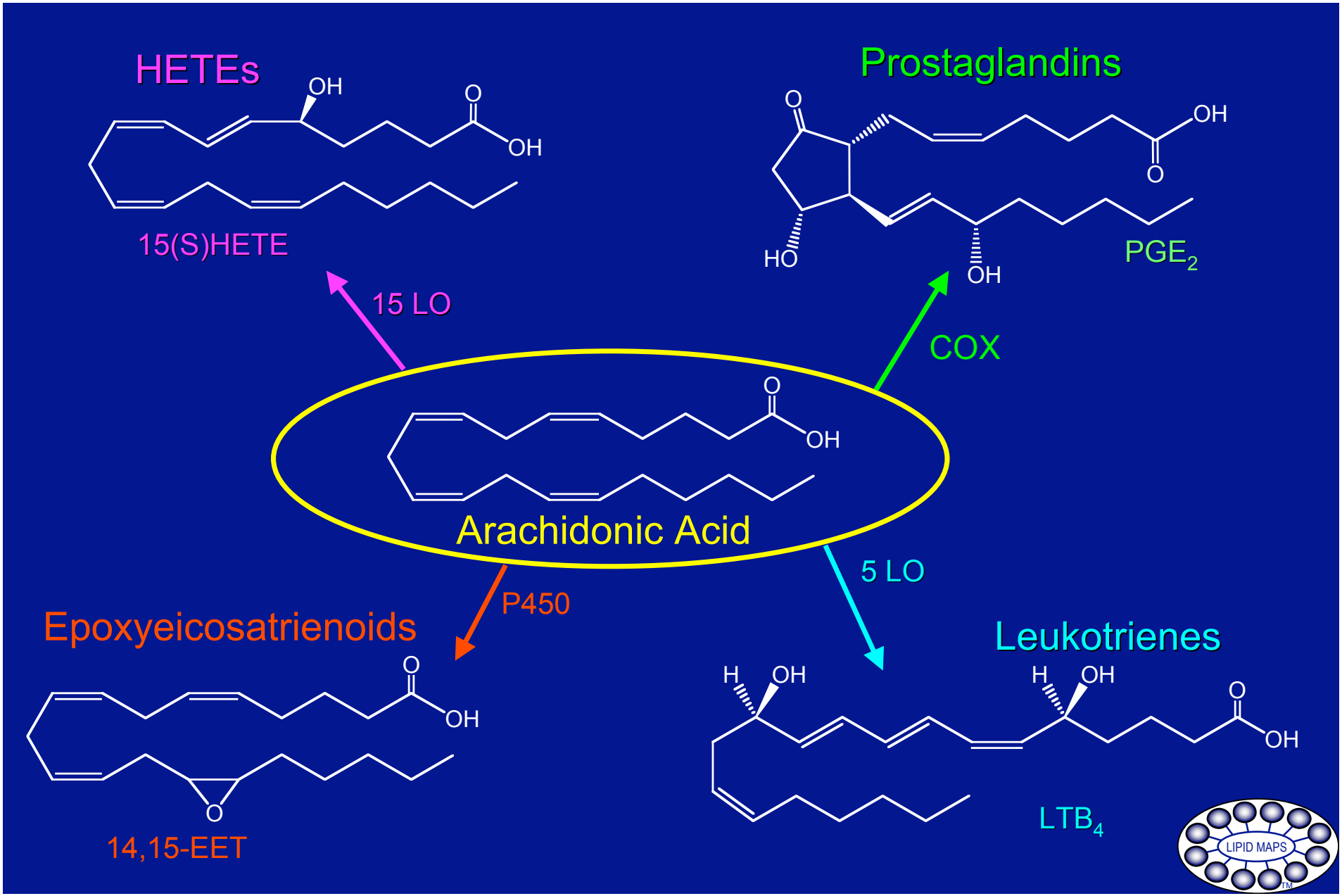
Prenols/Structural Lipidomics

Christian Raetz - *Duke*

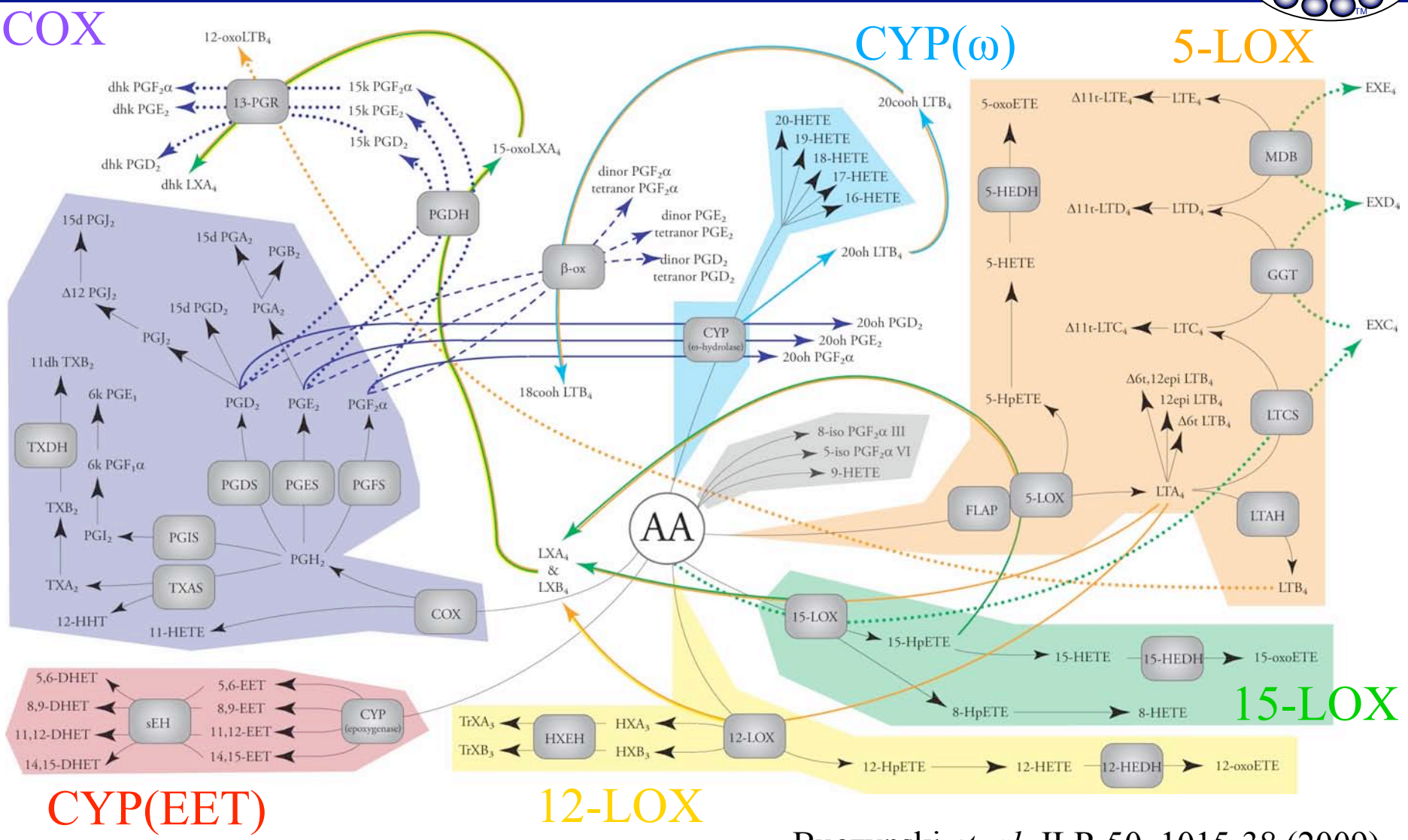
Oxidized Lipids Bridge

Joe Witztum - *UCSD*

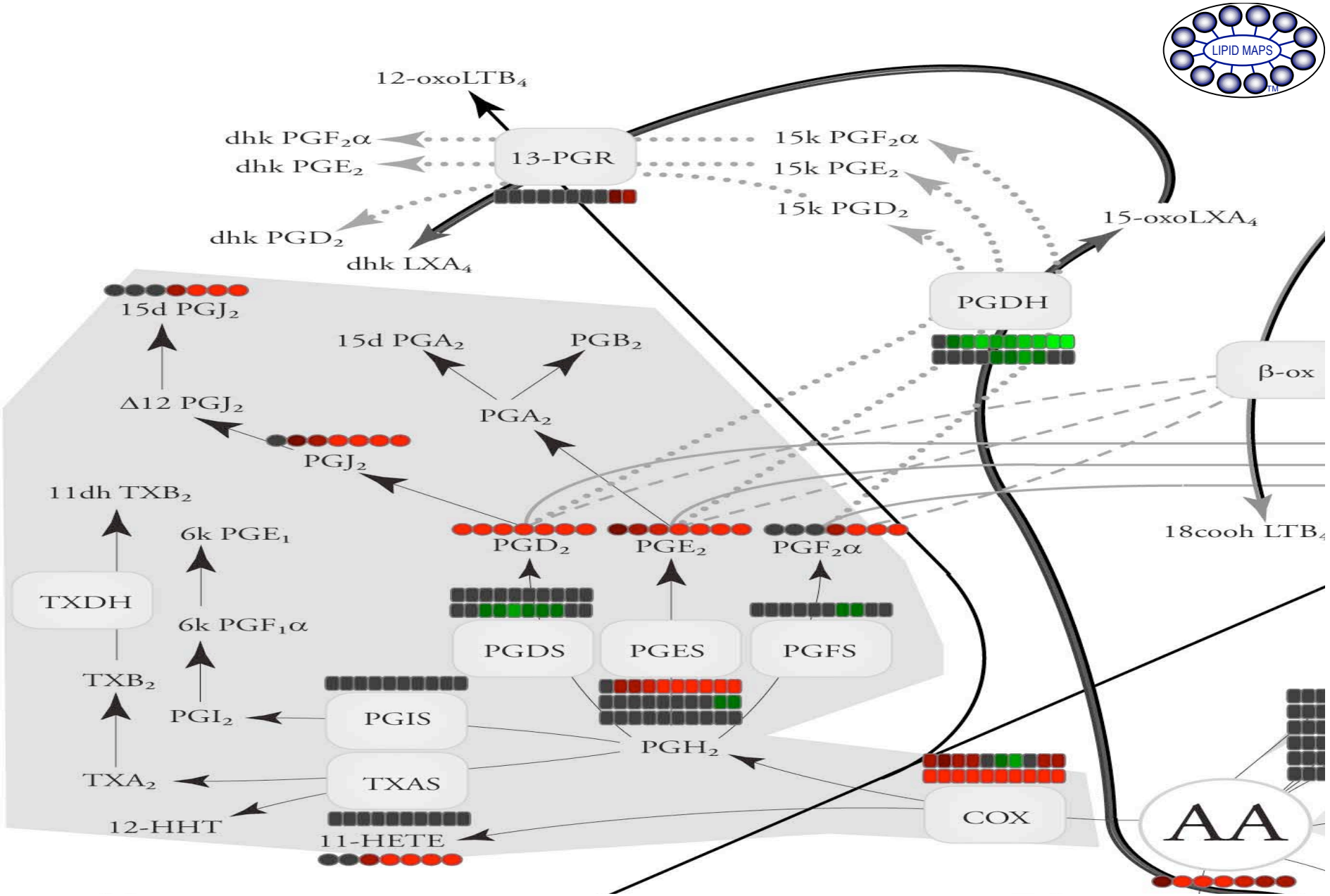

Kdo2 Lipid A (LPS species)
A Specific Agonist of TLR-4
on RAW 264.7 macrophages
Raetz et al [2006] JLR 47. 1097-111
Nuclei – DAPI
Mitochondria – MitoTracker Red
LIPID MAPS


HETEs
OH
O
OH
15(S)HETE
Prostaglandins
O
OH
O
HO
OH
PGE2
15 LO
COX
O
OH
Arachidonic Acid
P450
5 LO
Epoxyeicosatrienoids
O
OH
O
14,15-EET
Leukotrienes
H
OH
H
OH
O
OH
LTB4
LIPID MAPS

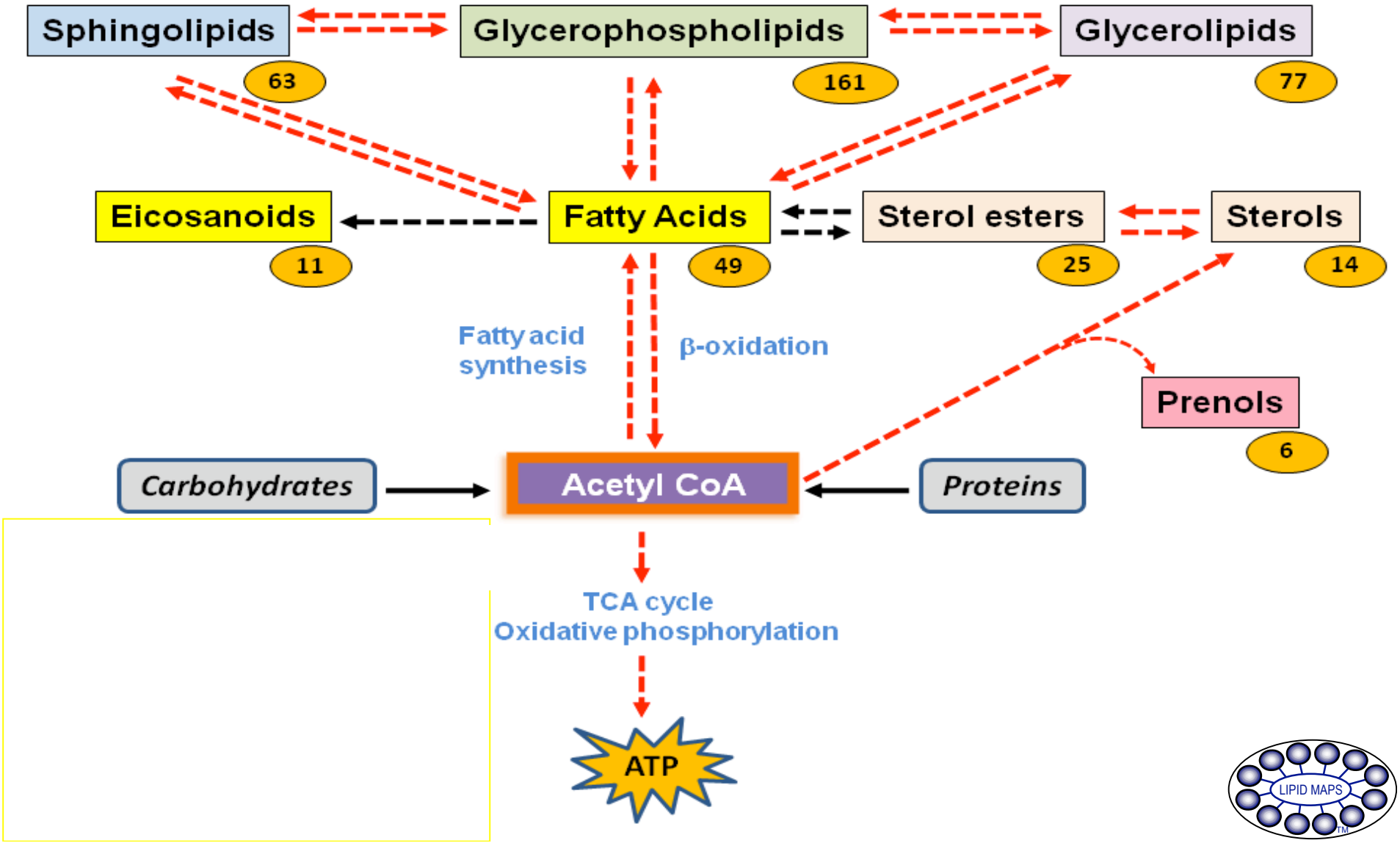
EICOSANOIDS



Buczynski *et. al.* JLR 50, 1015-38 (2009)

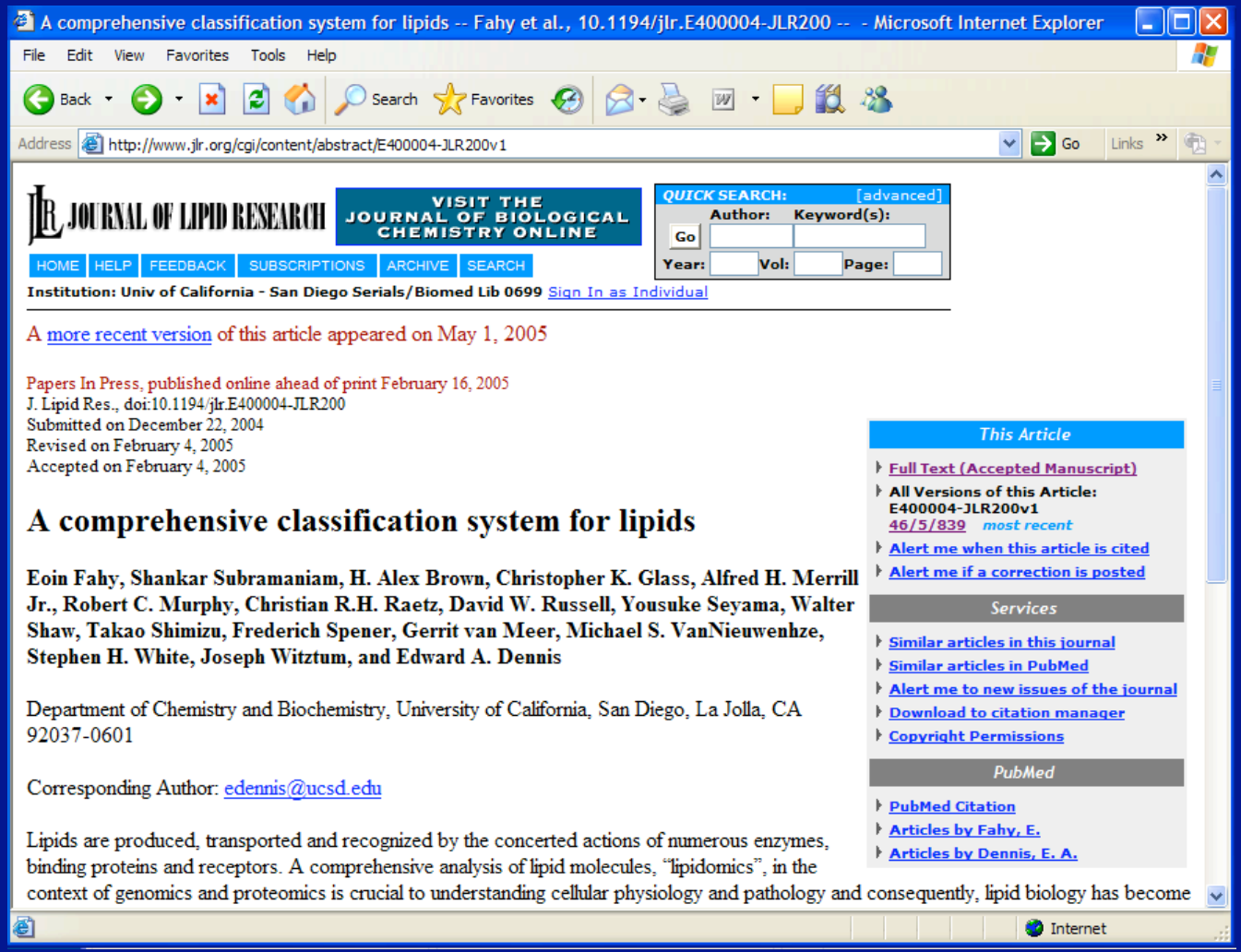

LIPID MAPS
12-oxoLTB4
dhk PGF2α
dhk PGE2
dhk PGD2
dhk LXA4
13-PGR
15k PGF2α
15k PGE2
15k PGD2
15-oxoLXA4
PGDH
β-ox
18cooh LTB4
15d PGJ2
15d PGA2
PGB2
Δ12 PGJ2
PGA2
PGJ2
11dh TXB2
6k PGE1
PGD2
PGE2
PGF2α
TXDH
6k PGF1α
PGDS
PGES
PGFS
TXB2
PGI2
PGIS
PGH2
TXA2
TXAS
12-HHT
11-HETE
COX
AA

MACROPHAGE LIPID METABOLISM

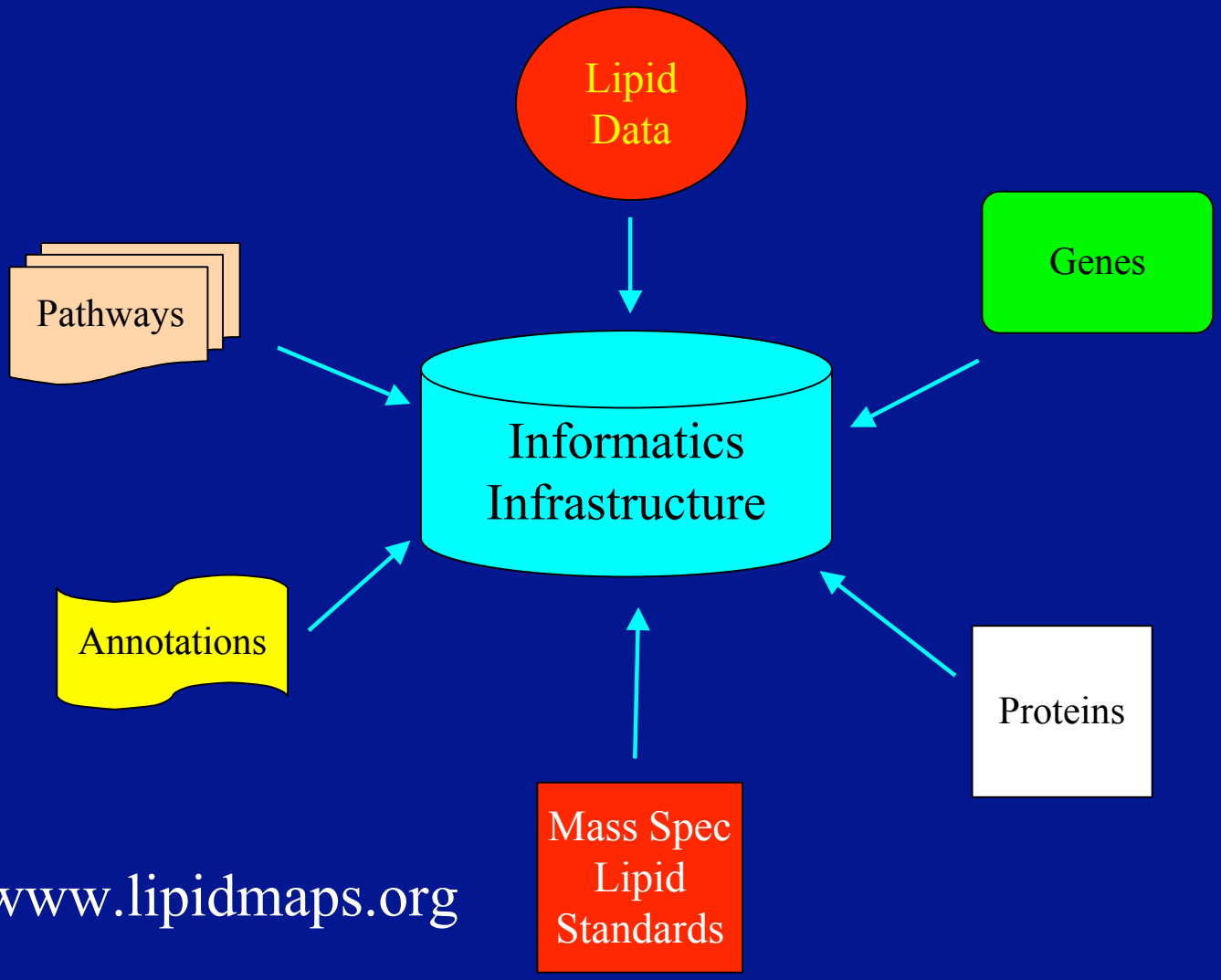


Classification, Nomenclature, Structure

J. Lipid Research (2005) 46, 839-862 ; (2009) 50, S9-14 www.lipidmaps.org



LIPIDOMICS COMPONENTS



www.lipidmaps.org


LIPID MAPS MEETING - NOV 2-3, 2002
Michael VanNieuwenhze
Bob Murphy
Ray Deems
Chris Glass
Al Merrill
John Wooley
Shankar Subramaniam
Walt Shaw
Cameron Sullards
David Russel
Ed Dennis
Chris Raetz
Alex Brown
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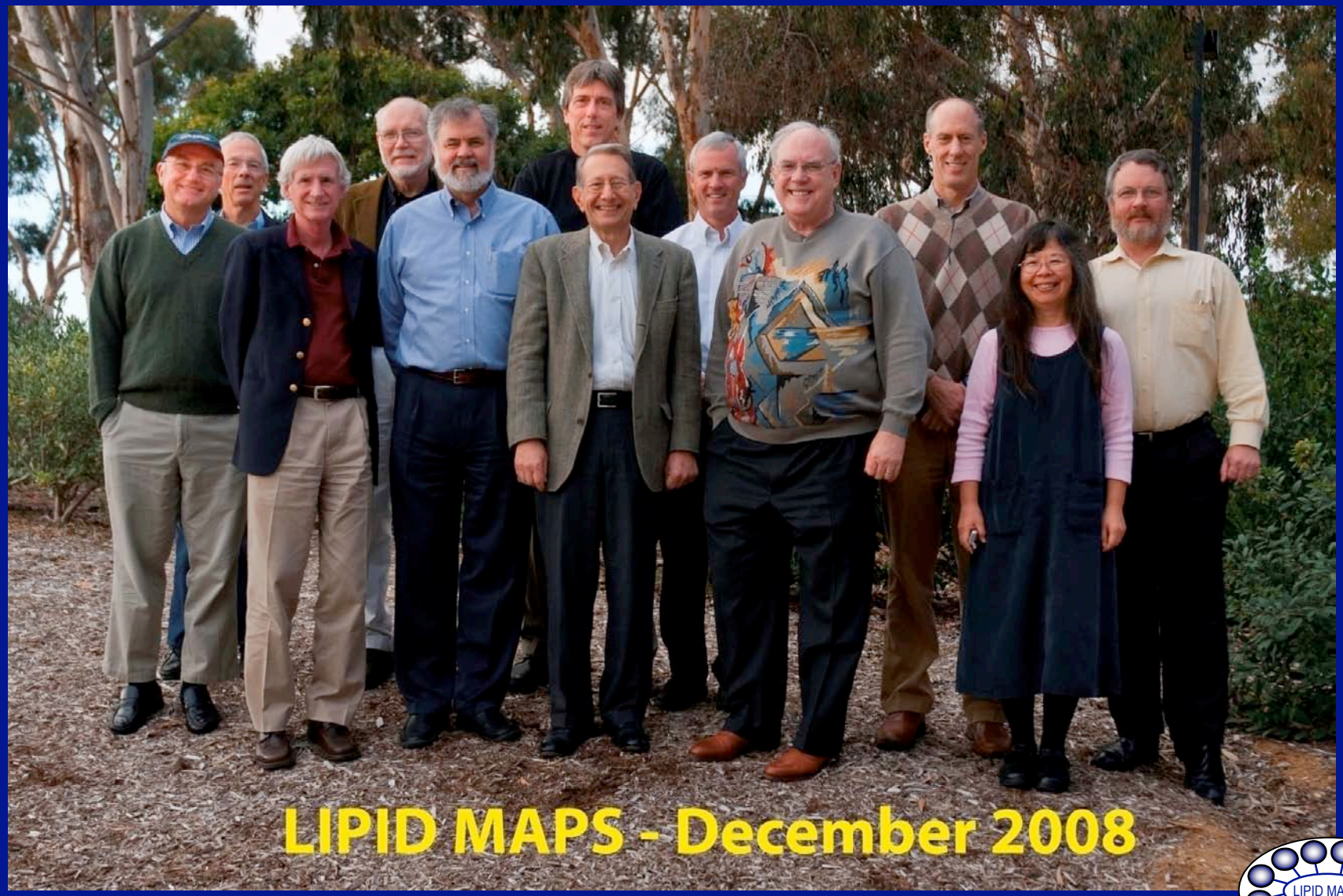
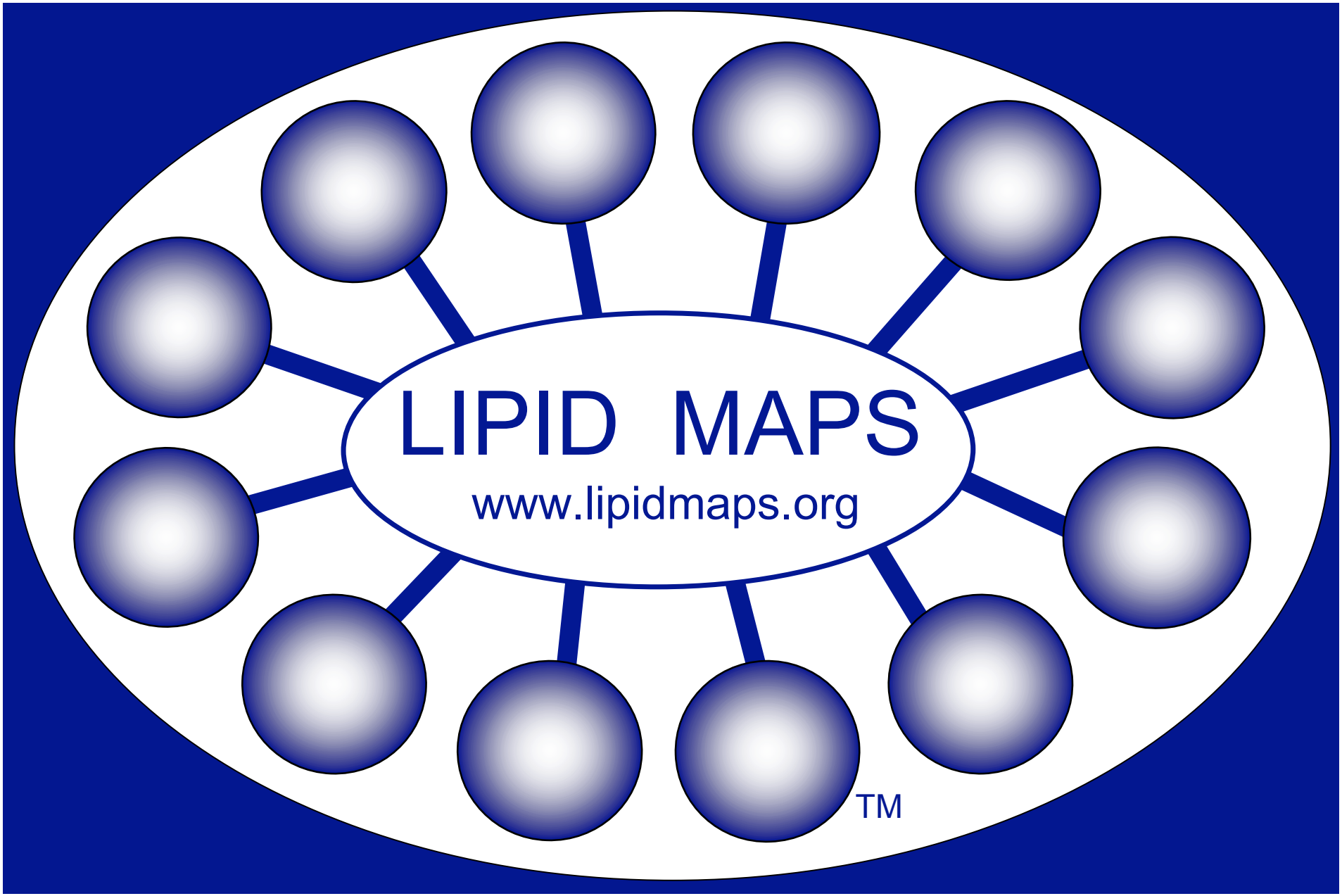
NIH U54 GM 69338


LIPID MAPS - December 2008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