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Molecular approaches to investigate anticancer effects of natural compounds

Team: “Cancer Epigenetics”

Laboratoire de Biologie Moléculaire et Cellulaire du Cancer (LBMCC)

Pr. Marc Diederich

Hôpital Kirchberg – Luxembourg



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Cell death & inflammation signaling

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- An “Häerz fir Kriibskrank Kanner” *asbl*

Patient samples were obtained from:

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- “Institut Paoli-Calmettes” (Marseille, France)
- “Centre Hospitalier Luxembourg”
- Red Cross Luxembourg
- “Clinique privée Dr. E. Bohler” (Luxembourg)
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Collaborations:

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een Häerz fir kriibskrank Kanner *asbl*



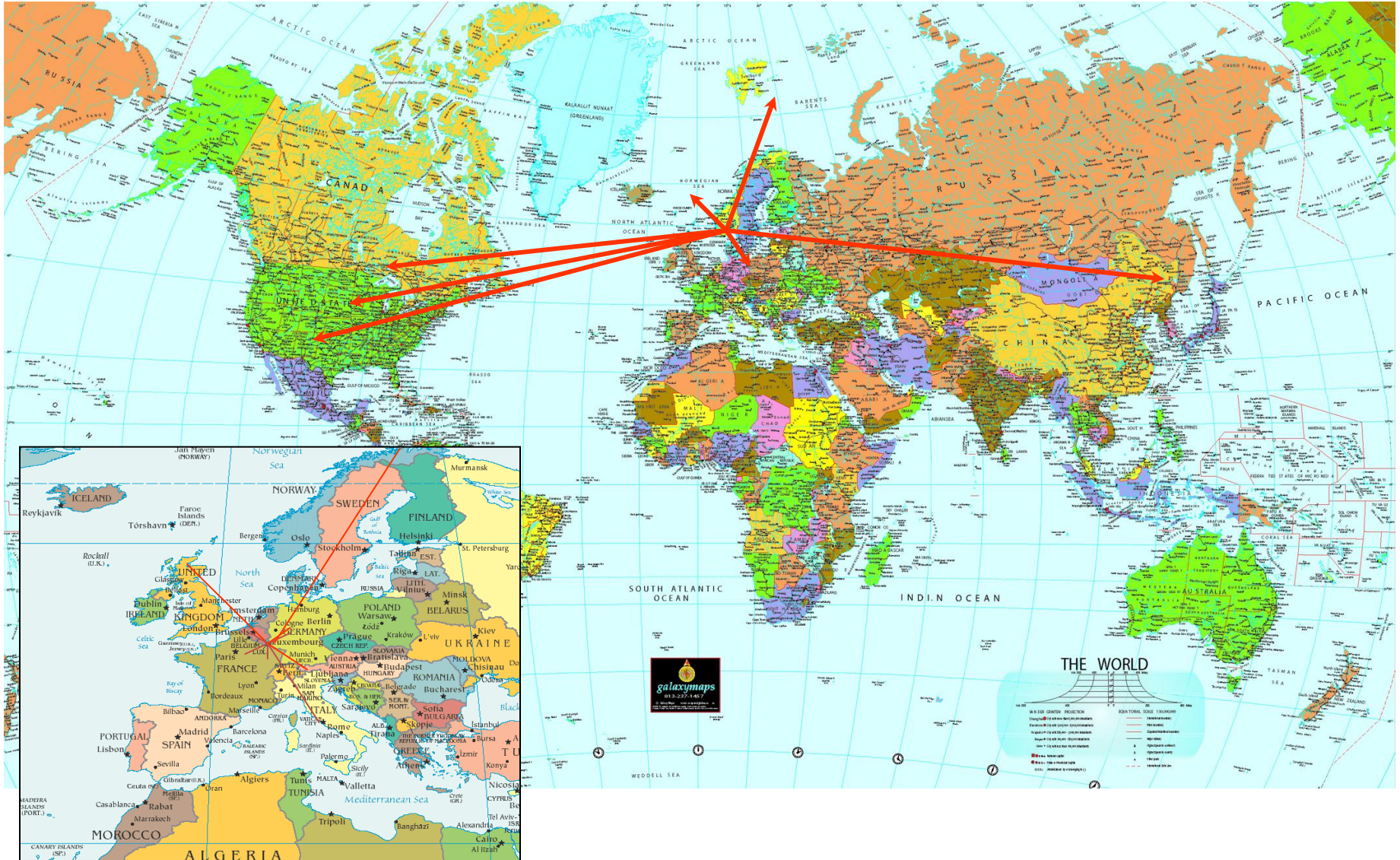
Fonds National de la
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National collaborations



- **Laboratoire de Biologie Moléculaire Végétale CRP-Santé**
André Steinmetz
 - **Life Sciences Research Unit, University of Luxembourg**
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 - **RCMS Lab**
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 - **Red Cross, Luxembourg**
PBMCs
 - **Kirchberg Hospital**
Cord blood, tumor samples
-

International collaborations



Links with international doctoral schools



LBMCC students

- **University of Nancy I**
 - Master in molecular pharmacology
 - Master in molecular biology/enzymology
- **University of Reims**
- **Free University of Brussels**
- **University of Heidelberg**
- **University of Rome « Tor Vergata »**
- **University of Aberdeen**
- **University of Strasbourg...**

Visiting students

- **University of Tromsø**
 - **University of Innsbruck**
 - **University of Bonn**
 - **University of Tübingen**
 - **University of Metz...**
-

Applied research in the field of cancer



We test natural and synthetic compounds ...

- . that induce cell death:
 - Senescence, autophagy, necroptosis, apoptosis

- . that affect epigenetic marks:
 - HDAC inhibitors (HDACI)
 - DNMT inhibitors/DNA demethylating agents

- . that inhibit inflammation:
 - NF- κ B and COX2 inhibitors

- . that affect erythrocyte differentiation:
 - Anti-thalassemia agents

Analysis from the natural compound to the cell



New substance (pure compound or extract mixture)

Determination of interesting molecules
(chemical entity analysis) *

Test in Cell culture

Proliferation

Anti-inflammatory

Cytotoxicity

Epigenetic marks
modifications

Viability

Morphology

NF- κ B (COX2)
pathway

HDACi

DNA
demethylating
agents

Apoptosis

Autophagy

Senescence

Chemosensitization

Differentiation

Analysis of the biological effects of new substances (pure compound or extract mixture)



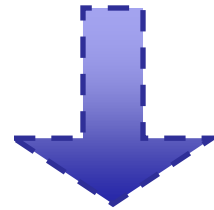
Cellular approach

Cell Culture

Light & Fluorescence
Microscopy

Immunostaining &
Histochemistry

Flow Cytometry



Molecular approach

Real-time PCR

Immunoprecipitation

Gel shift

Chromatin
immunoprecipitation

Western blot

HDAC/DNMT assay

Transfection & Gene
reporter assays



System biology

DNA Microarrays

Protein Microarrays

Gel 2D/Spectrometry