











# INVITATION TO PARTICIPATE IN A BLENDED INTENSIVE PROGRAM (BIP):

# **Trace Elements in Health and Disease - A Clinical Laboratory Perspective + Hot Topics**

Format: Blended (Presential + Online)

**Duration:** 5 days of in person sessions (including hands-on laboratory work) + 20 hours of online teaching. **Target audience:** students in pharmaceutical sciences, pharmacy, biomedical sciences, biochemistry,

clinical laboratory sciences, and related fields.

Dear colleagues,

Warms greetings from the Faculty of Pharmacy, University of Porto (FFUP).

We are currently in the process of organizing a Blended Intensive Program (BIP)<sup>i</sup> scheduled to take place during the week of **July 21–25**, **2025**.

As you may know, according to the BIP regulations, these programs must be developed and implemented by a **minimum of three higher education institutions (HEIs)**, from at least three EU Member States or associated third countries, forming a so-called a "Blended Intensive Program partnership".

Additionally, for the BIP to be carried out, a minimum of 15 student participants is required.

At this stage, and with some urgency, we kindly ask for your feedback on the following:

- 1) Would your institution be willing to join this BIP partnership?
- 2) How many students from your institution might be expected to participate.

We understand it may be difficult to give a definitive answer to the second question at this point. Therefore, we suggest:

- a) Consulting your institution's International Relations Office regarding the availability of mobility funding (Erasmus+ short-term mobility grants,) including the number of scholarships that could be allocated.
- 2) Sharing this opportunity with your students to assess their interest in attending this BIP (with in-person component in Porto, from July 21-25).

We would be very grateful if you could respond as soon as possible so we can proceed with the program planning and meet the necessary requirements.

Thank you in advance for your consideration and support.

Best regards,

Prof. Dr. Agostinho Almeida (PharmD; PhD)

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Erasmus Coordinator & BIP Organization Coordinator













# PROVISIONAL PROGRAM – Presential component

DAY 1 – Monday
Theme: Introduction

**09:00 – 09:30** | Welcome & Program Overview

09:30 - 13:00 | Lectures: Trace Elements - overview

Elemental composition of the human body. "Bio-elements". Essential elements. Bertrand diagram. Importance of chemical forms (species). Recommended daily dose. Food supplements as a source of essential minerals.

"Toxic" elements. Main sources of exposure.

Concentration of trace in the different human "compartments" (whole blood, plasma/serum, urine, faeces).

Other relevant elements. Elements with biomedical / therapeutic applications.

**13:00 – 14:00** | Lunch break

**14:00 – 16.00** | *Lectures* (cont.)

16:00 - ... Networking & Socio-cultural program

#### DAY 2 – Tuesday

**Theme:** Clinical and Toxicological Relevance of Trace Elements

**09:00 – 13:00** | *Lectures* 

Essential trace elements. Biochemistry. Clinical manifestations of deficiency. Toxic trace elements. Main mechanisms of toxicity. Sources of exposure. European

regulations on "elemental impurities" in air, water, food, cosmetics and drugs.

Determination of trace elements in Clinical Chemistry/Toxicology Laboratory: why/for what? Most frequently determined elements.

**13:00 – 14:00** | Lunch break

**14:00 – 16.00** | *Lectures* (cont.)

16:00 - ... Socio-cultural program

## DAY 3 – Wednesday

**Theme:** Analytical Techniques for Trace Elements Determination

**09:00 – 11:00** | *Lectures* 

Instrumental analytical techniques for trace element analysis: fundamentals, characteristics, applicability; associated problems / interferences; application examples. a) Atomic absorption spectrophotometry (AAS) with flame atomization; b) AAS with electrothermal atomization; c) Inductively coupled plasma mass spectrometry (ICP-MS). Hyphenated techniques for "speciation". Coupling of chromatographic systems with ICP-MS.

11:00 - 13:00 - Practical Demo: ICP-MS and AAS for trace element analysis

**13:00** – **14:00** | *Lunch break* 

14:00 – 16:00 – Practical Demo: ICP-MS and AAS for trace element analysis (2<sup>nd</sup> round)

16:00 - Socio-cultural program

















DAY 4 – Thursday

**Theme:** *In the Laboratory* **09:00 – 11:00** | *Lectures* 

In the laboratory. General precautions for sample collection. Contamination control. Clean rooms. "Metal free" materials and reagents. Standard solutions and certified reference materials. Quality control (QC)/control samples. Internal QC. External quality assessment. Basics of Laboratory Accreditation.

11:00 – 13:00 – At the Laboratory / Practical Demo: Sample analysis. The concept of analytical run. QC practices.

**13:00** – **14:00** | *Lunch break* 

**14:00 – 16:00** – *Lecture* | Basics on analytical method validation.

At the Laboratory / Practical Demo: Sample analysis. Practical aspects of analytical method validation.

16:00 - ... Socio-cultural program

DAY 5 - Friday

**Theme:** Post-analysis **09:00 – 13:00** | *Lectures* 

Reference values ("biological reference intervals" and "critical values"). How to define "reference values". Interpreting laboratory results. Clinical case presentations.

**13:00** – **14:00** | Lunch break

14:00 – 16:00 | Key messages to retain. Assessment of learning outcomes. Parting words.

(END of formal in-person BIP)

## Selected provisional "HOT TOPICS" for virtual (on-line) component

- Trace elements and neurocognitive disorders
- Manganese and acquired hepatocerebral degeneration (AHD)
- Trace element and COVID + supplementation in long COVID
- Trace elements in human milk
- An elemental mapping of human brain
- Role of trace elements in microbiome modulation
- The natural exposure to lithium and suicide rate in general population
- Trace elements imbalances in hemodialysis patients
- Single particle/ single cell metal analysis
- Chelatotherapy practices and controversies
- Trace elements and inflammatory bowel disease (IBD)
- The EU "health claims" of macrominerals and trace elements

ii "During these BIP, groups of students or staff as learners will undertake a short-term physical mobility abroad combined with a compulsory virtual component facilitating collaborative online learning exchange and teamwork. The virtual component must bring the learners together online to work collectively and simultaneously on specific assignments that are integrated in the blended intensive programme and count towards the overall learning outcomes".

<sup>[</sup>https://wikis.ec.europa.eu/spaces/NAITDOC/pages/95553249/Blended+Intensive+Programmes]