Consent to participate in a research study

Title of Research Study: The Impact of Dietary Phosphorus on Postprandial Carbohydrate Metabolism and Diet Induced Thermogenesis

Experiment 2: *Assessing the independent effect of dietary phosphorus on protein metabolism and energy expenditure, in the presence of phosphorus*

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Co-Investigators: Rania El Khoury, Karen Zoghbi
Address: American University Beirut, Hamra, Beirut – Lebanon/01 – 350 000
Site where the study will be conducted: American University of Beirut- Department of Nutrition and Food Science

You are likely aware of this study through your contact with our co-investigators who briefly described the study design upon receival of an invitation email script and/or through your individual interest for participation in this **research study** after seeing our hung posters on your faculty's billboard. Before agreeing to participate in this study, it is important that you read the information below. This statement describes the purpose, procedures, benefits, risks, discomforts, and precautions of the study. Also described are the alternative procedures, if any, available to you, as well as your right to withdraw from the study at any time. You should feel free to ask any questions that you may have.

Purpose of the overall research: Phosphorus is a mineral that is naturally present in our foods and is required by our bodies for normal function. It is known to have an essential role in an individual's overall metabolism, whereby a compromise in its status may indirectly contribute to the onset of several metabolic conditions, such as insulin resistance and obesity. The overall objective of this study is to measure the impact of dietary phosphorus on carbohydrate and energy metabolism via the continuous monitoring of blood glucose levels and body temperature. To entirely serve this

objective, macronutrient composition and phosphorus content of standardized meals will be manipulated in the course of three sequential experiments. Changes in post prandial glucose levels, body temperature, and heat flux will subsequently be measured.

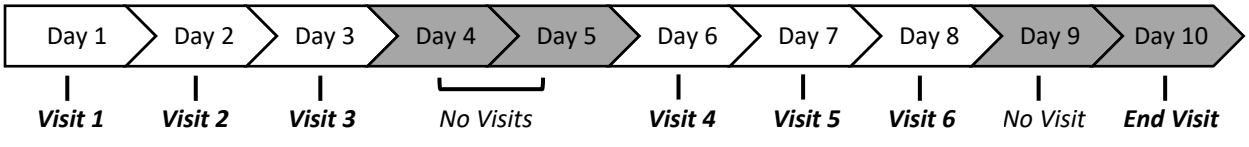
This research project will include **three** different interventional experiments. You may choose to participate in one or more of the three experiments.

Purpose of Experiment 2: to measure the effect of phosphorus on protein metabolism and consequently on energy expenditure, in addition to investigating the independent impact of phosphorus found in dairy foods on glycaemia of healthy individuals.

A. Project/Procedures Description: A researcher will contact you to go over the study procedures and go through a pre-screening evaluation questionnaire with you to check if it is safe for you to participate. The estimated time for the pre-screening questionnaire administration will be around 20 to 30 minutes. If you meet the preliminary inclusion criteria, you will be asked to show up for a screening visit within the nearest time. During this visit, we will take your anthropometric measurements (weight, height, and BMI), body composition analysis test (a detailed breakdown of your weight in terms of muscle, fat, and water), a finger-prick blood test to rule out diabetes or prediabetes as well as a urine test to rule out kidney failure. Body composition will be assessed using the *Inbody 770* machine, whereby you will have to stand still and align your feet with the foot electrolytes while grabbing the handles. Your body measurements will then be automatically generated. Urine samples will be analyzed at the American University of Beirut. The estimated time for this screening visit will be also about 20 to 30 minutes. We will walk you through the study's timeline and protocol. If you are still happy to take part, you will then be asked to sign this consent form.

This experiment requires a sample size of 16 (8 males and 8 females).
Exclusion criteria for this experiment include: overweight or obesity, any significant medical disease, including renal failure diabetes and pre-diabetes, lactose intolerance or allergies to milk, eggs and/or dairy foods, having done any bariatric surgeries, history of kidney stones, history or current psychiatric illness, weight loss of 3% or more in the preceding 3 months, pregnancy or lactation.

The duration of this experiment is 10 days. For this experiment, you will be asked to attend multiple visits at the Faculty of Agriculture and Food Sciences/ American University of Beirut, as illustrated in the Figure below. For each of the visits (except for the end visit), you will be asked to come in the morning following a 12-hour overnight



fast, and consume a breakfast meal at the facility. You will have to refrain from engaging in any strenuous physical activity and alcohol consumption, one day prior to each visit.

On your first visit, a trained study staff will insert a glucose monitoring device and a body temperature device. The temperature monitoring device is totally non-invasive. It can be comfortably worn and attached to a strap around the chest area. It continuously measures real-time core body temperature.
The glucose monitoring device is a water-resistant device that gets inserted beneath the abdomen's skin. The insertion process is simple and pain-free. It provides continuous glucose readings that get updated every 5 minutes.
Study staff will instruct you in a one-to-one session on the use of these wearable devices, their respective mobile applications, and overall compliance, noting that the glucose monitoring device is inserted by trained staff and under normal circumstances, you should not remove it during the 10-day study period. Please note that you will have to download the core mobile application to allow for measurements of core body temperature. As for the glucose monitoring device (Dexcom), you will be supplied with receivers to detect glucose readings since their mobile application is not compatible with all phone types. As such, you will also have to always keep the receiver with you. The body temperature device is easy to displace but you are advised to keep it in the required position for optimized temperature recording. In case any abnormal values appear, the research team will immediately detect them and will message you to make sure that the devices worn are well positioned and that your phone was within 6 meters with no obstacles (like walls or metal). Noting that this distance should be further reduced if there is water between the glucose monitoring device and receivers (for example, while showering or swimming). If this is not the case, you will be advised to consult your family doctor. In case of any adverse events arise as a result of the current protocol, HIP should be covering for any "medical treatment" that might be needed.
You will also be asked and trained to log your daily dietary intake over the 10-day study period, on the food data record sheets which will be provided to you. On these sheets, you will have to record your daily dietary intake along with the exact time of ingestion, ingredient quantities, and physical activity records. You will then have to return these filled data sheets to the co-investigators on the 4^{th} and 9^{th} day of the study. You will surely have the chance to ask any questions and clarify any confusions in case of any. This visit should take approximately 60 minutes in total.

On your subsequent visits, you will consume your offered breakfast meals(600kcal) while wearing the continuous glucose and temperature monitoring devices. These visits should take approximately 30 minutes. You will be asked to stay stationary and fast for 3 hours

after the ingestion of every breakfast meal, after which you may eat as much you want, while recording your entire daily intake. To help us know better about your appetite during this experiment, you will be provided with appetite score sheets to fill in every 15 minutes for 2 hours after ingestion of the breakfast meal.

On your last/end visit, you will just be visiting the facility for the removal of your glucose and body temperature monitoring devices.

The breakfast meals offered on your visits will be safely prepared and packaged in the Pilot Plant [Department of Nutrition and Food Sciences/ American University of Beirut]. For this experiment, your breakfast meal will be composed of a dairy meal shake which will consist of full fat powdered milk, granulated sugar, corn oil, dried egg white powder, water and a few drops of artificial flavor, ingested with one of the tablets below:

- Phosphate binding tablet: Sevelamer Carbonate or Renvela, which will be used to prevent the absorption of phosphorus from your meal. Dosage used is 800 mg/meal.
- Empty phosphorus-free placebo pill

A. **Duration:** The estimated time to complete this experiment is 10 days. You may leave the study at any time. If you decide to stop participating, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with AUB.

B. **Risks and discomforts:** We do not expect that there will be any risks associated with taking part in this study, except for the time commitment and compliance required of you. There will be some minor discomfort related to the wearable glucose and temperature monitoring devices. The temperature monitoring device is totally non-invasive. The glucose monitoring device, however, monitors activity via the use of a slim sensor, which gets inserted beneath the abdomen's skin, by a one-touch auto-applicator. The sensor insertion process is simple and pain-free and will only be inserted by fully trained research staff, in order to reduce any potential risks of discomfort. The phosphate binding tablets are orally administered pharmaceuticals, widely approved for the treatment of hyperphosphatemia. They are efficacious in preventing phosphate absorption from meals, without causing any metabolic or gastrointestinal side effects or discomfort in the short term. In fact, most of the safety experience is with sevelamer carbonate tablets, as mentioned in its prescribing information. Some of the adverse effects usually associated with its long-term use in studies include vomiting (22%), nausea (20%), diarrhea (19%), dyspepsia (16%), abdominal pain (9%), flatulence (8%), and constipation (8%). If you predict that you may be pregnant or if you became pregnant during the study, it may involve currently unforeseeable risks to your embryo.

C. **Benefits:** Although there are no immediate benefits for you from being part in this research project, it is hoped that this work will have a beneficial impact on the advances of human nutrition in improving metabolism and glucose tolerance; ultimately preventing the development of insulin resistance and obesity, which have been classified as global chronic threats.

D. **Confidentiality:** To secure the confidentiality of your responses, your name and other identifiers will never be attached to your answers. All codes and data will be kept in a locked drawer in a locker room or in a password protected computer that is kept secure. Data access is limited to the Principal investigator and researchers working directly on the project. All data will be destroyed responsibly after the required retention period, which is a minimum period of three years - in line with the University's expectations. In case of withdrawal from the study, all data collected from you up to the point of withdrawal will remain part of the study database and may not be removed. Your privacy will be maintained in all published and written data resulting from this study. Your name or other identifying information will not be used in our reports or published papers. If you decide to withdraw from the study, our investigators will ask you if you wish to provide further data collection from routine medical care.
Designated individuals of the American University of Beirut and the University of Nottingham may be given access to data for monitoring and/or audit of the study to ensure we are complying with guidelines. This research study will be written up as a dissertation for the degree of PhD in Clinical Nutrition, and will be registered on ClinicalTrials.gov. Upon successful submission of the dissertation, we ultimately aim to openly share the knowledge resulting from this research project with the public, and hence the research may also be published in scientific journals. Publications will not contain any identifiable personal data. Your privacy will be protected and maintained in all written and published data.

F. Compensation/Incentive: You will be given Amazon vouchers of $40 as reimbursements for expenses incurred as a result of your participation in each of the three experiments ($40 per experiment). These shall include transportation costs, parking fees, and lost work time fees. The study will be done at absolutely no cost from you.

G. Payment for Research-related Injury: This study is associated with minimal risk. However, there may be unforeseeable risks. In case of any adverse event as a result of the study, you will be covered by the Health Insurance Plan (HIP), provided to you by the AUB. In the unlikely event of any adverse event as a result of the study, there will be no compensation to cover such expenses, in case it is not covered by the HIP.

If you are injured as result of participating in this study or for questions about a study-related injury, you may contact Dr. Omar Obeid at 01/355555-ext 4440 or send him an email at oo01@aub.edu.lb.

H. Contact Information and Questions:
1) If you have any questions or concerns about the research, do not hesitate to contact the principal investigator:
Dr. Omar Obeid, 01/355555-ext 4440; oo01@aub.edu.lb

Or any of the following research co-investigators:
Rania El Khoury, 03999896, ree10@aub.edu.lb
Karen Zoghbi, 70112818, kfz03@mail.aub.edu

2) If you have any questions, concerns or complaints about your rights as a participant in this research, feel free to contact the following office at AUB:
Biomedical Institutional Review Board: irb@aub.edu.lb, 00961 1 350000-ext 5445

I. Participant Rights: Participation in this study is voluntary. You are free to leave the study at any time without any negative consequences and penalty. Your decision not to participate does not influence your relationship with AUB. Please note that the investigator has the right to terminate your participation in the study, under circumstances of unethical conduct and/or disrespectful behavior. In case of such misconduct, you will be informed over the phone or face to face about the termination of your participation. In case of any research risks occurring, your participation will also be terminated and any adverse effect you may face as a result will be reported to IRB and covered by HIP. Your compensation will then be determined depending on how far you have reached in the study.
Do you have any questions about the above information?
Do you wish to participate in this study?
Yes _____ No _____

J. Future Contact
Would you like to be contacted for future research?
Yes _____ No _____
Please notify that the investigator has the right to end your participation in this study.

H- Patient's Participation:

I have read and understood all aspects of the research study and all my questions have been answered. I voluntarily agree to be a part of this research study and I know that I

can contact Dr. Omar Obeid at Tel: +961-1-350 000 Ext: 4440 or any of his/her designee involved in the study in case of any questions. If I feel that my questions have not been answered, I can contact the Institutional Review Board for human rights at +961 -1-350000 Ext: 5445. I understand that I am free to withdraw this consent and discontinue participation in this project at any time, even after signing this form, and it will not affect my care or benefits. I know that I will receive a copy of this signed informed consent.

_____	_____	_____
Name of Patient or Legal Representative or Parent/Guardian	Signature	Date & Time

_____	_____	_____
Witness's Name (if patient, representative or parent do not read)	Witness's Signature	Date &Time

K- Documentation of Consent:

_____	_____	_____
Name of Person obtaining Consent of Person obtaining Consent	Signature	Date & Time

American University of Beirut
Institutional Review Board
17 February 2023
APPROVED