Calcium Metabolism & Osteoporosis Program
WHO CC for Metabolic Bone Diseases

A Paradigm to Advance the Agenda for Non Communicable Diseases in the Region

Ghada El-Hajj Fuleihan, MD, MPH, FRCP
American University of Beirut, Beirut, Lebanon

NIH FIC Director International Webinar Series
April 7, 2015
Agenda

- The Context and the Program
- Program’s Research Focus, Initiatives and Achievements
- Capacity Building and Training
- Key Collaborations
- Challenges
- Future Plans
Agenda

- The Context and the Program
- Program’s Research Focus, Initiatives and Achievements
- Capacity Building and Training
- Key Collaborations
- Challenges
- Future Plans
About the American University of Beirut

- The American University of Beirut is a teaching-centered research university founded to provide excellence in education, to participate in the advancement of knowledge through research, and to serve the peoples of the Middle East and beyond.

- Founded in 1866, chartered in New York State, AUB has around 700 faculty members and a student body of around 8,000.

- AUB includes six faculties and offers more than 120 programs leading to the bachelor's, master's, MD, and PhD degrees. Collaborations of this program are with:
  - Faculty of Medicine FM
  - Faculty of Health Sciences FHS
  - Faculty of Agriculture and Food Sciences FAFS
AUB’s Medical Center (AUBMC), is the only medical institution in the Middle East to have earned the three international accreditations: Joint Commission International (JCI), Magnet®, and the College of American Pathologists (CAP).

AUBMC is 350-bed capacity medical center with plans for a 600-bed medical complex by 2020.

AUBMC has several Specialty Programs and Centers of Excellence: The Calcium Metabolism and Osteoporosis Program-WHO CC for Metabolic Bone Disorders is one of them.
Noncommunicable Diseases
Country Profiles 2011

World Health Organization
The WHO identified Non-Communicable Diseases (NCDs) as the leading cause of death, accounting for 2/3 of all deaths worldwide.

These included cardiovascular diseases, diabetes, obesity and cancer.

Global urbanization, sedentary lifestyle, and an increase in life expectancy, are projected to increase NCD burden worldwide.
The WHO identified Non-Communicable Diseases (NCDs) as the leading cause of death, accounting for 2/3 of all deaths worldwide. These included cardiovascular diseases, diabetes, obesity and cancer. Global urbanization, sedentary lifestyle, and an increase in life expectancy, are projected to increase NCD burden worldwide.

Osteoporosis is no exception to this rising tide of NCDs.

Its heavy toll, social or economic, cannot be ignored.
Calcium Metabolism and Osteoporosis Program

- Founded in December 1997, a center of expertise for metabolic bone disorders (MDB).

- Its mission is to promote excellence in clinical care, research and education in disorders of calcium and bone metabolism.

- The program received the official designation by the World Health Organization as a “WHO Collaborating Center (WHO-CC) for Osteoporosis and Metabolic Bone Disorders” 2010, renewal to 2018.

- Program’s Webpage including information on research, education/training, guidelines, clinical services, publications, news and awards can be accessed at: http://www.aub.edu.lb/fm/cmop/Pages/index.aspx
Agenda

- The Context
- Program’s Research Focus, Initiatives, Achievements
  - **Classical**: Osteoporosis and hypovitaminosis D
  - **Pleotropic**: Obesity/Metabolic Syndrome and Cancer
- Capacity Building and Training
- Key Collaborations
- Challenges
- Future Plans
Key Themes and NCD Agenda

- **Osteoporosis: a Growing NCD**
  - Disease Manifestations
  - Epidemiology in West and MENA

- **Hypovitaminosis D: The root of many NCDs**
  - Disease Manifestations
  - Magnitude of Problem in West and MENA

- **Advancing Health Care Agenda of NCDs in MENA**
  - Defining magnitude of the problem/disease burden
  - Risk assessment of specific NCD at individual level
  - Prevention and treatment guidelines for disease
  - Endorsement by stakeholders and policy makers
  - Awareness campaigns
Key Themes and NCD Agenda

- **Osteoporosis: a Growing NCD**
  - Definition and Disease Manifestations
  - Epidemiology in West and MENA

- **Hypovitaminosis D: The root of many NCDs**
  - Disease Manifestations
  - Magnitude of Problem in West and MENA

- **Advancing Health Care Agenda of NCDs in MENA**
  - Defining magnitude of the problem and disease burden
  - Risk assessment of specific NCD at individual level
  - Prevention and Treatment Guidelines for Disease (CE models)
  - Endorsement by stakeholders and policy makers
  - Awareness campaigns
Osteoporosis
A Common and Costly Disease

- Every 3 seconds an osteoporotic fracture occurs worldwide.
- Half of people with one osteoporotic fracture will have another one.
- For women this risk is higher than the risk of breast, ovarian, and uterine cancers combined.
- For men, the risk is higher than the risk for prostate cancer.
- Fractures are costly and incur morbidity & mortality
Osteoporotic Fractures
Increased Mortality

### Defining Magnitude of Problem

**Prevalence of Vertebral Fractures* in Women**

<table>
<thead>
<tr>
<th></th>
<th>Lebanon</th>
<th>Netherlands</th>
<th>Mayo-US</th>
<th>SOF-US</th>
<th>EPIDOS-Fr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Range</td>
<td>73(6)</td>
<td>≥65</td>
<td>65-85</td>
<td>72(5)</td>
<td>80(3)</td>
</tr>
<tr>
<td>Age Range</td>
<td>65-85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mild fractures excluded

MAGNITUDE of The Problem: MENA vs WORLD

Age Standardized Incidence Rates /100,000 for Hip Fracture in Women

Background

- **Osteoporosis**
  - Definition and Epidemiology in West and MENA

- **Hypovitaminosis D: at the root of OP and many other NCDs**
  - Disease Manifestation
  - Magnitude of Problem in West and MENA

- **Advancing Health Care Agenda of NCDs in MENA**
  - ME Africa Osteoporosis IOF Audit: Disease Burden, Knowledge and Care Gap
  - Fracture Risk Calculator: FRAX
  - Osteoporosis Prevention and Treatment Guidelines
  - Vitamin D Guidelines
  - Lebanese National Task Force for Osteoporosis Assessment and Treatment
  - Lebanese Society for Osteoporosis and Metabolic Bone Disorders
Vitamin D Synthesis by Latitude

World map relating latitude by geographic regions to skin ability to synthesize vitamin D

Vit D for 11/12 mo/yr

Vit D all year

NO Vit D for >6 mo/yr
# Severe Vitamin D Deficiency

## Worldwide Prevalence of Rickets

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia, Middle East, and Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mongolia</td>
<td>1998</td>
<td>70</td>
</tr>
<tr>
<td>Tibet</td>
<td>1994</td>
<td>66</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1997</td>
<td>42</td>
</tr>
<tr>
<td>Yemen</td>
<td>1987</td>
<td>27</td>
</tr>
<tr>
<td>Turkey</td>
<td>1994</td>
<td>10</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1998</td>
<td>9</td>
</tr>
<tr>
<td>Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Netherlands – macrobiotics</td>
<td>1990</td>
<td>55</td>
</tr>
<tr>
<td>UK – Manchester, minorities*</td>
<td>2002</td>
<td>1.6</td>
</tr>
</tbody>
</table>

* Ethnic minorities, 77% were of SE Asian origin (predominantly Pakistani).

Prevalence of clinical or radiological rickets in children not suffering from other diseases reported within the last 20 years.\(^{1,7-10}\)

Reproduced from Prentice et al. (2006)\(^6\) with permission.

Mean Serum 25-hydroxyvitamin D by Country

Mean 25(OH)D (ng/mL) by country and descending latitude (North to South)

Summer
Equatorial
Winter

Mean serum 25(OH)D (ng mL⁻¹)

Sweden - 61N
UK - 52.5N
Netherlands - 51N
Germany - 50.5N
Switzerland - 48N
Hungary - 47N
France - 46.5N
Spain - 40.5N
Turkey - 39.5N
South Korea - 38N
Japan - 35.5N
Lebanon - 34N
Mexico - 34N
Thailand - 13N
Malaysia - 4N
Brazil - 19S
Chile - 34S
Australia - 34S
OVERALL

Non-Skeletal D Functions

Metabolism of 25OHD to 1,25OHD for
Vitamin D and Impact on Health

• **Musculoskeletal benefits:** BMD decreased falls and fractures—Evidence based
  El-Hajj Fuleihan JCEM 2006

• **Non Classic Pleotropic Manifestations—Associations studies**
  o **Decreased Mortality**
    Semos et al. PLoS one 2012;
    Zitterman Am J Clin Nutr 2012; 95(1):91-
  o **Decreased Cancer**
  o **Decreased Cardiovascular disease**
  o **Decreased risk of diabetes and metabolic syndrome**
Rickets: Bow Legs, Knock Knees
### Magnitude of the Problem ME - Asia

<table>
<thead>
<tr>
<th>Vitamin D Cutoffs</th>
<th>Countries</th>
<th>% with low 25-OHD (N) / Age</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt;5ng/ml</strong> (12.5nmol/L)</td>
<td>UAE</td>
<td>44 (34) Preterm</td>
<td>Dawodu et al, 2011</td>
</tr>
<tr>
<td></td>
<td>Iran</td>
<td>38 (1111) 9-12 y</td>
<td>Neyestani et al, 2011</td>
</tr>
<tr>
<td><strong>&lt;10ng/mL</strong> (25nmol/L)</td>
<td>Iran</td>
<td>46 (1111) 9-12 y</td>
<td>Neyestani et al, 2011</td>
</tr>
<tr>
<td></td>
<td>KSA</td>
<td>81 (433) 12-15 y</td>
<td>Siddiqui et al, 2007</td>
</tr>
<tr>
<td></td>
<td>Pakistan</td>
<td>33 (75) newborns</td>
<td>Hossain et al, 2011</td>
</tr>
</tbody>
</table>

Predictors: Age/Gender, SES, Season, Clothing Style
Vitamin D and Health

- **Vitamin D deficiency results in morbidity**
  - Rickets, fractures, failure to grow, infections in children
  - Increased risk for falls, osteoporosis and fractures in adults.

- **Vitamin D treatment prevents rickets in children & fractures in adults.**

- **Vitamin D guidelines in Western Populations:** issued by multiple US and International Organizations
  - **None in MENA:** Lebanese Vitamin D Guidelines/Systematic Review and Meta-analysis (in process)

- **Vitamin D may play an important role for other Non-Communicable Diseases:** Diabetes, Metabolic Syndrome, Cancer, and some auto-immune disorders. (Lebanese Elderly vitamin D RCT just completed)
Osteoporosis and Hypovitaminosis D in MENA

- Common disorders in MENA
- Costly disorders: Disease Burden societal and financial
- Preventable and treatable disorders
- Need a tailored approach to

Advance Health Care Agenda in MENA
Background

- Osteoporosis: a Growing NCD
  - Definition and Disease Manifestations
  - Epidemiology in West and MENA
  - Health Care Costs

- Hypovitaminosis D: The root of many NCDs
  - Disease Manifestations
  - Magnitude of Problem in West and MENA

- Advancing Health Care Agenda of Osteoporosis in MENA
  - Defining magnitude of osteoporosis
  - Individual Risk Assessment: FRAX calculator
  - Lebanese Guidelines for Disease Prevention and Treatment
    - Osteoporosis
    - Vitamin D Guidelines
  - ME Africa Osteoporosis IOF Audit: Disease Burden, Knowledge and Care Gap
Magnitude of the Problem
Incidence of Hip Fracture in Lebanese 2006-2008

Incidence of Hip Fracture per 100,000 population


MOH hip fracture registry data
Sibai AM, El Hajj Fuleihan, Osteoporos Int 2011

Incidence of Hip Fracture in Lebanese 2006-2008

Incidence of Hip Fracture per 100,000 population


MOH hip fracture registry data
Sibai AM, El Hajj Fuleihan, Osteoporos Int 2011
## Health Care Burden: Lebanon

<table>
<thead>
<tr>
<th>Medical Problem</th>
<th>Bed days per Year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Fractures**</td>
<td>7700-12,000</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>8755</td>
</tr>
<tr>
<td>Ovarian Cancer</td>
<td>855</td>
</tr>
<tr>
<td>Prostate Cancer</td>
<td>3805</td>
</tr>
<tr>
<td><strong>Source of Info</strong></td>
<td><strong>Cost/Case US $</strong></td>
</tr>
<tr>
<td>WHO Bulletin 1999</td>
<td>8700</td>
</tr>
</tbody>
</table>

*El Hajj Fuleihan et al IOF Middle East Africa Audit 2011*
Fracture Risk Assessment

Universal On-line Fracture Risk Calculator FRAX
Uses Risk Factors and Bone Density
To identify High Risk Individuals
Country Specific

FRAX Lebanon was first to Launch in Region in Sept 2009
Most validated data over several years based on national registry
Used as model by several countries in region with no country specific FRAX
What is FRAX?

- FRAX is a web-based tool that provides a calculator for the assessment of fracture probability in men and women. It is widely accessible as of Feb 2008 (www.shef.ac.uk/FRAX).

- Similar to risk calculators for other NCDs:
  - Gail Model breast cancer risk model
  - Cardiovascular disease scores: Framingham and Reynold’s scores

- Country Specific

- The approach uses easily obtained clinical risk factors (CRFs) to estimate 10-year fracture probability.

- The estimate can be used alone, or with femoral neck bone mineral density (BMD), to enhance fracture risk prediction.

Adapted from McCloskey IOF-ISCD FRAX initiative 2010
FRAX® Countries

By Sept 2009: 18 countries
Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: Lebanon
Name/ID: 

Questionnaire:
1. Age (between 40 and 90 years) or Date of Birth
   Age: 52
   Y: 
   M: 
   D: 

2. Sex
   ○ Male  ○ Female

3. Weight (kg)
   62

4. Height (cm)
   165

5. Previous Fracture
   ○ No  ○ Yes

6. Parent Fractured Hip
   ○ No  ○ Yes

7. Current Smoking
   ○ No  ○ Yes

8. Glucocorticoids
   ○ No  ○ Yes

9. Rheumatoid arthritis
   ○ No  ○ Yes

10. Secondary osteoporosis
    ○ No  ○ Yes

11. Alcohol 3 or more units/day
    ○ No  ○ Yes

12. Femoral neck BMD (g/cm²)
    Select BMD

BMI: 22.8
The ten year probability of fracture (%)
without BMD
- Major osteoporotic: 2.5
- Hip Fracture: 0.3

Weight Conversion
Pounds ➔ kg

Height Conversion
Inches ➔ cm

00023382
Individuals with fracture risk assessed since 1st June 2011
Lebanese Guidelines for Osteoporosis Assessment and Treatment
“Who to Test, Who to Treat”

Initial document 2002*
First Update 2007*
FRAX Based Update 2013#

*Endorsed by Lebanese Society of Endocrinology, Rheumatology, OBGYN, Orthopedics, Radiology, MOH and WHO
# all of above plus Internal Medicine, Family Medicine
Advancing the Osteoporosis Health Care Agenda

1986
NOF founded

1985
1990
1995
2000
2005
2010
2015

1994
WHO BMD Dx OP

1998
NOF Guidelines

2004
Surgeon General OP Report

2008
NOF FRAX Guidelines

2004
Surgeon General OP Report

2008
FRAX launched

2009
National Action Plan for Bone Health

2006
OSTEOS founded

2009
FRAX Lebanon launched

2007
1st Update on Guidelines

2009
NOF FRAX Guidelines

2010
National Bone Health Alliance

2010
1st Update on Guidelines

2012
FRAX based guidelines

2011
Associated Research UNIT for Osteoporosis

2010
ME-Africa OP Audit

USA

Lebanon

1997
CaMOP

1997

2002
Lebanese Guidelines

2002

2006
Lebanese Guidelines

2006

2009
FRAX Lebanon launched

2009

2010
FRAX based guidelines

2010

2010
National Task Force for Osteoporosis

2010-2018
WHO CC for Osteoporosis

Establish National Priorities and Agenda

DEFINING the MAGNITUDE of THE PROBLEM
THE MIDDLE EAST &AFRICA REGIONAL AUDIT
Epidemiology, Costs & Burden of Osteoporosis in 2011

Ghada El-Hajj Fuleihan, MD, MPH Lead Author
Gemma Adib, MD First Author
Najla Itani, Asma Arabi, Rafic Baddoura, co-authors

www.iofbonehealth.org
Burden of Osteoporosis is to Increase

- Projected increase in the ageing populations: up to 40% will be over the age of 50 years in many countries

- High prevalence rates of vitamin D deficiency: Risk factor for osteoporosis. Others: heavy smoking, sedentary lifestyle, low socioeconomic levels

- The IOF ME-Africa audit assessed current and projected disease burden, and identified gaps in knowledge and care, relevant to osteoporosis in this region.
<table>
<thead>
<tr>
<th>Country</th>
<th>2010</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuwait</td>
<td>650</td>
<td>800</td>
</tr>
<tr>
<td>UAE</td>
<td>700</td>
<td>1200</td>
</tr>
<tr>
<td>Jordan</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td>Lebanon</td>
<td>1500</td>
<td>2200</td>
</tr>
<tr>
<td>Tunisia</td>
<td>3164</td>
<td>5101</td>
</tr>
<tr>
<td>Morocco</td>
<td>3410</td>
<td>4610</td>
</tr>
<tr>
<td>Syria</td>
<td>4000</td>
<td>5500</td>
</tr>
<tr>
<td>KSA</td>
<td>9000</td>
<td>n/a</td>
</tr>
<tr>
<td>Turkey</td>
<td>24,000</td>
<td>36,000</td>
</tr>
<tr>
<td>Iran</td>
<td>50,000</td>
<td>62,000</td>
</tr>
</tbody>
</table>
GAPS Identified by Audit

- Not a Health Priority in many countries
- Lack of qualified human capital
- Lack of national databases and registries for fractures
- Lack of data for hospital stays, costs incurred by hip fractures and other NCDs, and QALY indicators
  Low awareness and low visibility of osteoporosis in medical training
- **CARE GAP**: diagnostics and therapeutics
Audit Outcomes

- Provided evidence needed to develop strategies to CLOSE KNOWLEDGE GAP AND CARE GAP in MENA region

- Establish a national agenda for relevant priorities
  - FUNDING for RESEARCH on Osteoporosis
  - Establish a national hip fracture registry & make FRAX available
  - Assess morbidity and mortality from hip fractures
  - Assess epidemiology of non-hip fractures
  - Health Policies for health care allocation

- Formulate or revise National Clinical Practice Guidelines, Education and Quality Assurance Programs
Advancing the Osteoporosis Health Care Agenda Lebanon

- **CAPACITY BUILDING: Two National Regional Osteoporosis Centers**
  - WHO Collaborating Center in Osteoporosis (AUB)
  - National Collaborative Center for Metabolic Bone Disorders (AUB lead center-SJU, RHUH)

- **RESEARCH/Knowledge**
  - Major Research Program
  - Fracture Risk Calculator FRAX Lebanon Sept 2009, updated Jan 2012
  - Osteoporosis Societies: Physician Society: OSTEOS and Patient Society: LOPS
  - Public Awareness

- **ADVOCACY/POLICY: Engage and Support National Health Authorities to facilitate Policy:** National Lebanese Task Force for Osteoporosis by MOH Ministerial Decree March 2010.
Advancing the Osteoporosis Health Care Agenda Education

Physician Oriented

- Annual OSTEOS meetings
- National and Regional Osteoporosis Academy course 2012, 2013
- Websites: WHO CC at AUB and OSTEOS
- Quarterly OSTEOS newsletter

Patient Oriented

- Osteoporosis Patient Guides/Brochures at AUB
- MOH and Ministry of Social Affairs (MOSA) Patient Guides and hip fracture brochures
Advancing the Osteoporosis Health Care Agenda

- **Funding**
  - Institutions: American University of Beirut-St Joseph University
  - National: Lebanese National Council for Scientific Research
  - Regional WHO - Pharma and Nestle Foundation
  - USA: NIH-FIC-ODS

- **Health Care Initiatives and Health Policy**
  - Lebanese Scientific Societies
  - Lebanese Ministry of Health
  - Lebanese Ministry of Social Affairs and Ministry of Education
  - WHO Lebanon and WHO EMRO
CaMOP Network of Research and Collaborations
Cross-Roads of Research with Health Care/Policy

AUB

Intradepartmental
- Hem-Oncology
- Gastroenterology

Interdepartmental
- Neurology
- Pediatrics
- Orthopedics
- OBGYN

Interfaculty
- FAFS
- FHS

International

Societies Organizations
- WHO Geneva/EMRO
- WHO Sheffield CC
- Int Osteoporosis Foundation
- Int Soc Clinical Densitom
- Am Soc Bone Mineral Res

CaMOP WHO CC

Academic Institutions
- Brigham and Women’s Hospital, USA
- Mayo Clinic, USA
- Odense University, Denmark
- Katholieke Universiteit Leuven, BE

Lebanon

Inter-institutional
- RHUH
- St. Joseph University

Lebanese Ministry of Health

WHO-Lebanon
Calcium Metabolism and Osteoporosis Program
WHO CC for Metabolic Bone Disorders

AUB-OP Program and WHO CC Center
- Rania Mneimneh, BS
- Ali Hammoudi, BS
- Maya Rahmeh, MSc
- Darrina Bassil, MPH
- Maha Hoteit, MSc
- Samia Mroueh
- Jinane Kronfol
- Nabil Khoury, MD.
- Asma Arabi, MD, MSc
- Elie Akl, MD, MPH, PhD
- Robert Habib, PhD
- Ghada El-Hajj Fuleihan, MD, MPH

OSTEOS Guidelines
- Angela Cheung, MD, PhD.
- Juliet Compston, MD.
- John A. Kanis, MD.
- William Leslie, MSc
- Michael McClung, MD.
- Eric Orwoll, MD.

WHO FRAX: Lebanon
- John A. Kanis, MD.
- Eugene McCloskey, MD.
- Helena Johansson, Ph.D.

ISCD- IOF FRAX International
- Jane Cauley, PhD.
- Marjorie Luckey, MD.

School of Health Sciences
- Ziyad Mahfoud, Ph.D. (WCMC-Q)
- Abla Sibai, Ph.D.

St Joseph University
- Rafic Baddoura, MD, MPH.

Ministry of Health
- Hilda Harb, MPH.
- Walid Ammar, MD.
- Mohammad Khalifeh, MD.

GRANT Support: AUB, St Joseph University, Pharma, Nestle Foundation, LNCSR, WHO National Institutes of Health
Agenda

- The Context and the Program
- Program’s Research Focus, Initiatives and Achievements
- **Capacity Building and Training**
  - Infrastructure at AUB and Nationally
  - Curricula: SHARP
  - Trainees: CaMOP and SHARP
- Key Collaborations
  - Within Disciplines: nationally and internationally
  - Across Disciplines
- Challenges
- Future Plans
Calcium Metabolism and Osteoporosis Program/WHO Collaborating Center for Metabolic Bone Disorders 1997

Outcomes Research Unit (ORU)-2010

Scholars in HeAlth Research Program (SHARP)-2012

Vascular Medicine Program (VMP)-2012

Center for Systematic Reviews on Health Policy and Systems Research (SPARK)-2013

Other Centers of Excellence including Cancer Centers
Scholars in HeAlth Research Program
SHARP

SHARP Summer Certificate
Master in Sciences for Scholars in Health Research

Capacity Building in Non-Communicable Diseases
At the American University of Beirut

NIH Grant Award
D43TW009118
Funded by NIH FIC and ODS
SHARP Faculty

American University of Beirut

PI, Co-investigators, TAG

American University of Beirut
Principal Investigator/Program Director
– Ghada El-Hajj Fuleihan, MD, MPH (FM)

Co-investigators/Executive Committee
– Robert, Habib, PHD (FM)-Summer Program Director
– Huda Huijer, PhD (HSON)
– Abla Sibai, PhD (FHS)
– Nahla Hwalla, PhD (FAFS)

Training Advisory Group (TAG)
– Kamal Badr, MD (FM)
– Ali Abu Alfa, MD (FM)
– Huda Zreik, PhD (FHS)

US Collaborators

Harvard Medical School-Scholars in Clinical Sciences Program: SCIP
HMS-NIH

US TAG Members
– Gordon H. Williams, MD
– Ellen Seely, MD

Harvard School of Public Health
Clinical Effectiveness Program: CEP
Director-co-directors HSPH

Consultants
– Earl Fran Cook, PhD.
– John Orav, PhD
Welcome

The Scholars in Health Research Program (SHARP) provides graduates with the required foundation to pursue a career in clinical and translational research, particularly focusing on Non-Communicable Diseases (NCDs). It offers didactic courses and hands-on training in the essential disciplines to conduct quantitative research, namely epidemiology, biostatistics, research ethics, and library science/informatics. SHARP offers a 12 credit summer certificate and a 40 credit MSc degree, jointly awarded by the Faculty of Medicine and the Faculty of Health Sciences at AUB.

(More) (SHARP Brochure) (Summary)

Mission

The Mission of the Scholars in Health Research Program (SHARP) at the American University of Beirut (AUB) is “To provide superior didactic education complemented with state-of-the-art interactive and practical training in health research, with a focus on non-communicable diseases research. It is intended for physicians and other health care professionals, to improve and advance the health care agenda for non-communicable diseases in Lebanon and the region”.

http://www.aub.edu.lb/sharp/Pages/index.aspx
SHARP Mission

“To provide superior didactic education complemented with state-of-the-art interactive and practical training in health research, with a focus on non-communicable diseases research. It is intended for physicians and other health care professionals, to improve and advance the health care agenda for non-communicable diseases in Lebanon and the region.“
# Schema for SHARP Schedule

## Intensive Summer Program

- EPI I/EPI II
- Biostatistics
- Research Ethics
- Library Science

## Required Courses - Fall

- Clinical/Advanced Trials
- Advances In NCD
- Leadership in Organizations

## Spring

- Systematic Review & Meta-analysis
- Policy and Decision Making in Health Care

## Longitudinal Seminar Series I

Bioethics in clinical research, mock IRB/study section, genetics, career development, progress report

## Select Research Project

## Research Thesis

Survival Analysis and Genetics Modules - being developed
About SHARP

- **Targets stakeholders engaged in NCD health research** from various educational and training backgrounds.

- **Addresses the needs of population-oriented and patient-oriented** research.

- Combines didactic teaching, with intensive hands-on research experience through a mentored thesis project.

- **Bridges research and academia, clinical practice, management and health policy.**

- Provides an ideal vehicle for capacity building in NCD and promotes health research, and thus health, in Lebanon and the region.
Human Capital
CaMOP Trainees 1997-2015

**US Trainees 1993-1997**
- Ernest Darkom-Ampem
- Judith Carroll
- Susan Haden
- Lisa Porter
- Ellen Marqusee

**Trainees (MSc or MPH)**
- Amal Abi-Rafef
- Rania Abou Samra
- Mona Arafat
- Dania Hariri
- Wassan Ibrahim
- Siham Itani
- Nicole Jubran
- Aline Kizirian
- Joyce Maalouf
- Wissam Nasser
- Maya Rahmeh
- Maria Saadeh
- Rola Sabbagh

**Trainees (Resident & Fellows)**
- Zaher Ajam
- Ghada Ballane
- Hajar Ballout
- Maya Barake*
- Marlene Chakhtoura*
- Ghassan Chamseddine
- Jocelyne Eid
- Hussam El-Ali
- Cynthia Farah
- Ahmad Fawaz
- Nisrine Ghazal
- Mirella Hajj
- Yousra Hawli
- Haytham Hraybeh
- Zeinab Issa
- Najla Itani
- Ziad Kanaan
- Walid Khairallah
- Omar Kreidieh
- Maria Matar
- Nancy Nakhoul*
- Lamis Jomaa**

**Trainees (MD+ MPH/MSc)**
- Asma Arabi**
- Sevag Demerjian
- Haytham Hraybeh
- Mona Mokaddem

**PhD**
- Lea Dib
- Adina Hazzouri
- Maha Hoteit
- Lamis Jomaa**

*SHARP MS Students
** Faculty members
CaMOP Trainees Awards

- **Dr Marlene Chakhtoura** Early Career Forum Travel award, Endocrine Society, 2015

- **Dr. Nisrine Ghazal** third prize, Clinical Research Open House at AUB, 2014


- **Zeinab Issa**, Novo Nordisk Endocrinology Excellence Award Best Research Paper, travel grant to attend ENDO Meeting 2012. Postmenopausal Hormone Therapy and BP.

- **Maya Barake**, Novo Nordisk Endocrinology Excellence Award Best Research Paper, travel grant to attend ENDO Meeting 2011 meeting." 25-Hydroxyvitamin D Assay Variations and Impact on Clinical Decision Making". Basis for QA for Vitamin D

- **Joyce Maalouf**, AUB Dean Thomas Sutherland Award for Graduate Excellence for 2006-2007, for Master thesis entitled: "Interaction between dietary calcium, exercise and leptin and their impact on musculoskeletal parameters in children and adolescents".
Human Capital National and Regional SHARP Trainees 2013-2015

43 Summer Certificate graduates, 6 Master Students

Akl et al, Journal of Nutrition and Metabolism 2012
Productivity of SHARP Trainees

Students are publishing in first tier journals and presenting in International Conferences.

Accepted Manuscripts:

Manuscripts in Revision:

Manuscripts in Submission:
Productivity of SHARP Trainees, Cont’d

Accepted Abstracts


• Eight-year Target Lesion Revascularization Rates in Bare Metal Versus First and Second Generation Drug Eluting Stents: Analysis of 22,957 Stented Lesions. Sanaa Badour*Δ, Yumiko Kanei, Kamellia Dimitrova, Joseph Habib, John Fox, Robert Tranbaugh, Thomas Schwann, Samir Alam, Robert Habib*. American College of Cardiology 2015, San Diego, California.

*SHARP Trainees
Ψ received the Early Career Forum travel award to ENDO 2015: Endocrine Society’s 97th Annual Meeting & Expo, March 4-8, 2015 in San Diego
Δ got the highest ranking among abstracts, received from Lebanon, at the American College of Cardiology 2015
Productivity of SHARP Trainees, Cont’d

Accepted Abstracts, Cont’d


• Drug Eluting Stent Implantation in Multivessel Coronary Artery Disease Reduces the Adverse Effect of Diabetes on Late Outcomes when Compared to Bare Metal Stent. Sanaa Badour*, Kamellia Dimitrova, Yumiko Kanei, Robert Tranbaugh, Mark Hajjar, Ameer Kabour, Thomas Schwann, Robert Habib*. American Heart Association 2014, Chicago (Circulation 2014; 130:A16123).


SHARP MS Trainees Thesis Projects

Marlene Chakhtoura
“Optimal Dose of Vitamin D Replacement in Middle East and North Africa (MENA) Population Across all Age Groups: a Systematic Review and Meta-analysis of Randomized Controlled Trials.”

Maya Barake
“Effects of growth hormone therapy on bone mineral density and fractures in adults with osteopenia or osteoporosis and without growth hormone deficiency: a systematic review and meta-analysis.”

Karine El-Feghali

SHARP MS launched Summer 2013
these three trainees are first wave to graduate summer 2015
Agenda

- The Context and the Program
- Program’s Research Focus, Initiatives and Achievements
- Capacity Building and Training
  - Infrastructure at AUB and Nationally
  - Curriculae: SHARP
  - Trainees: CaMOP and SHARP
- Key Collaborations
  - Within Disciplines: nationally and internationally
  - Across Disciplines
- Challenges
- Future Plans
Capacity Building in NCDs at AUB

Faculty of Medicine (FM)
- CRU 2001
- Clin Epi 2011
- ORU 2010
- VMP 2012
- CaMOP 1997

Faculty Health Sciences (FHS)
- SHARP 2012
- SPARK 2013

Center for Population Health

Faculty of Agriculture, Nutrition and Food Sciences

Adult & Pediatric Cancer Centers & Registry
CaMOP Network of Research and Collaborations
Cross-Roads of Research with Health Care/Policy

AUB

- Intradepartmental
  - Hem-Oncology
  - Gastroenterology

- Interdepartmental
  - Neurology
  - Pediatrics
  - Orthopedics
  - OBGYN

- Interfaculty
  - FAFS
  - FHS

International

Societies Organizations
- WHO Geneva/EMRO
- WHO Sheffield CC
- Int Osteoporosis Foundation
- Int Soc Clinical Densitom
- Am Soc Bone Mineral Res

CaMOP WHO CC

Inter-institutional
- RHUH
- St. Joseph University

Lebanon

- Lebanese Ministry of Health

Academic Institutions
- Brigham and Women’s Hospital, USA
- Mayo Clinic, USA
- Odense University, Denmark
- Katholieke Universiteit Leuven, BE

WHO-Lebanon
Agenda

- The Context and the Program
- Program’s Research Focus, Initiatives and Achievements
- Capacity Building and Training
  - Infrastructure at AUB and Nationally
  - Curricula: SHARP
  - Trainees: CaMOP and SHARP
- Key Collaborations
  - Within Disciplines: nationally and internationally
  - Across Disciplines
- Challenges
- Future Plans
Challenges to Advancing NCD Agenda in MENA

Challenges to Conduct Research

- Difficulty balancing patient care and research responsibilities
- Expensive and long training time
- Limited mentoring capacity
- Burdensome regulations and paperwork
- Limited funding agencies and low success rate for funding

Limited National Infrastructure and Resources Human and Financial

- Inadequate training for research career path –
- Lack of national registries and databases for major outcomes
- Unavailable financial data
- Lack of a national agenda for health care priorities
- Limited resources for health care

Lack of continuity in vision and political instability
Agenda

- The Context and the Program
- Program’s Research Focus, Initiatives and Achievements
- Capacity Building and Training
  - Infrastructure at AUB and Nationally
  - Curricula: SHARP
  - Trainees: CaMOP and SHARP
- Key Collaborations
  - Within Disciplines: nationally and internationally
  - Across Disciplines
- Challenges
- Future Plans
Address Challenges & Capitalize on Opportunities

Addressing Challenges

- Secure Capacity building grants and career development awards
- Ensure “Protected time” for research and secure effective mentoring
- Streamline, standardize, and simplify regulatory requirements
- Engage and support National Health Authorities
- Enhance physician knowledge and patient knowledge
- Establish Networks to enhance collaborations, nationally, regionally and internationally
- Establish outcome databases and prospective cohorts
- Investigate Genetic and Epi-genetic underpinning of NCDs

Capitalize on Unique Opportunities

- Little known or published on many NCDs in MENA: open fields for research
- Consanguinity enhances unique genetic and epigenetic research
- Train the future Leaders and Policy Makers
- New leadership and interest in creating new and larger funding opportunities in MENA: Lebanon, Qatar, UAE ...
PARADIGM for ADVANCING AGENDA FOR NCDs
“Research is not a luxury that is affordable only in times of plenty but is a continuing necessity – and never more so than in hard times.”

*WHO Strategic Directions for Research for Health: Scaling up in the Eastern Mediterranean Region-Global Forum for Health Research, Jan 2009

The Global Approach to NCDs
from a Program as Nucleus to the Region & the World
“IT WAS IN MY HEART TO HELP A LITTLE BECAUSE I WAS HELPED MUCH”

Lebanese Poet-Writer-Philosopher-Painter- Gebran Khalil Gebran-1883-1931 Boston
Additional Information
Research Program Major Initiatives
and more on SHARP and collaborating Programs
VMP, SPARK, ORU
Calcium Metabolism and Osteoporosis Program Webpage

Publications can be accessed:

http://www.aub.edu.lb/fm/cmop/Pages/Publications.aspx
Calcium Metabolism and Osteoporosis Program Research Portfolio

- Conduct epidemiologic studies: retrospective, cross sectional and cohort studies to characterize MBD
- Conduct of vitamin D Randomized Controlled Trials (RCTs) on:
  - in school children, elderly and pregnancy
  - In children and adults with epilepsy
- Conduct of primary and secondary prevention RCTs in:
  - Postmenopausal osteoporosis and osteoporosis in men
  - Premenopausal women with breast cancer
- Data mining of institutional and national databases to identify knowledge gaps and assess health agenda needs to optimize management of osteoporosis and hip fractures
- Conduct and publish landmark systematic reviews, meta-analyses, including Cochrane systematic reviews on these topics as well as on bariatric surgery of direct relevance regionally and internationally

Calcium Metabolism and Osteoporosis Program

- Active Areas of Investigation Include:
  - Osteoporosis
  - Hypovitaminosis D and impact on musculoskeletal health across the lifecycle
  - Women’s health
  - Applications of bone densitometry measurements
  - Secondary causes of bone loss
  - Cancer–induced bone disease
  - Genetic polymorphisms in relevant markers modulating bone diseases including VDR, ER, and CYP2R, etc.
  - Guidelines development and dissemination, nationally and internationally

- Has been recently awarded in 2015 a supplemental grant from Office of Dietary Supplements (ODS) to conduct a comprehensive assessment of the genetics of the vitamin D pathway in the Lebanese, taking advantage of a completed one year randomized double blinded trial in elderly subjects investigating the effect of vitamin D, on 25(OH)D levels and indices of fuel and mineral metabolism.
Calcium Metabolism and Osteoporosis Program
National/Regional Initiatives and Achievements

- Founding a multidisciplinary National Society for Osteoporosis and Metabolic Bone Diseases 2006
- On-Line Fracture risk Calculator for Lebanon in collaboration with WHO FRAX group 2009
- Founding and Leading a National Task force on MBDs to develop and implement a national health priority agenda in this discipline: 2010
- Founding and leading a National Associated Research Unit for capacity building in Clinical Translational Research in MBDs 2011 with collaborations with two other major institutions
- Leading the 2011 International Osteoporosis Foundation (IOF) Middle East & Africa Regional Audit on Epidemiology, Costs and Burden of Osteoporosis
Calcium Metabolism and Osteoporosis Program
International Initiatives

- Development and dissemination of international clinical guidelines on osteoporosis and densitometry for the International Society of Densitometry (ISCD) since 2004

- Co-Chairing the 2010 FRAX International Initiative for the ISCD and International Osteoporosis Foundation (IOF)

- Member of the IOF writing group of Committee of Scientific Advisors on Key Position White Papers: Cancer and Bone and Diabetes and Bone (2014-ongoing)

- Co-Chairing the International Task Force on Term Bisphosphonate Therapy for the American Society of Bone Mineral Research 2013-2015
About SHARP

- It is a D43 funded grant program that was awarded in Sept 2012 by NIH/FIC and was launched at AUB in July 2013.

- SHARP is a hybrid curriculum development and training grant aimed at capacity building in Non-Communicable Diseases (NCDs) in Lebanon and the region.

- Modeled on Clinical Effectiveness Program at HSPH and in collaboration with HMS and HSPH
SHARP Faculty

American University of Beirut

PI, Co-investigators, TAG

American University of Beirut
Principal Investigator/Program Director
– Ghada El-Hajj Fuleihan, MD, MPH (FM)

Co-investigators/Executive Committee
– Robert, Habib, PHD (FM)-Summer Program Director
– Huda Huijer, PhD (HSON)
– Abla Sibai, PhD (FHS)
– Nahla Hwalla, PhD (FAFS)

Training Advisory Group (TAG)
– Kamal Badr, MD (FM)
– Ali Abu Alfa, MD (FM)
– Huda Zreik, PhD (FHS)

US Collaborators

Harvard Medical School
Scholars in Clinical Sciences Program: SCIP
HMS-NIH

US TAG Members
– Gordon H. Williams, MD
– Ellen Seely, MD

Harvard School of Public Health
Clinical Effectiveness Program: CEP
Director-co-directors HSPH

Consultants
– Earl Fran Cook, PhD.
– John Orav, PhD
SHARP Class 2013

Karine Al Feghali, MD
FM

Sanaa Badour, MD
FM

Maya Barake, MD
FM

Marlene Chakhtoura, MD
FM

Abdul Karim El Hage Sleiman, MD
FM

Mohamad El Zein, MD
FM

Mirella Hage, MD
FM

Rami Kantar, MD
FM

Samer Masri, MD
FM

Victor Nauffal, MD
FM

Safaa Ossaily, MD
FM

Elie Ramly, MD
FM

Khaled Shawwa, MD
FM

Maroun Yammine, MD
FM

Soha Talih, PHD
ENG

Mohamad Baydoun, MScN
HSON

Angela Massouh, MScN
HSON

Lara Kahale, BSN
FHS
SHARP Class 2014

*Zelnab Abu Yehia, MD
FM

Nour Al Jalbout, MD
FM

Imad Akel, MD
FM

Hind Alameddine, MD
FM

Belal Alrajoub, MSN
HSON

Zeina Ayoub, MD
FM

Sarah Bahouth, MD
FM

Dany Barrak, MD
FM

*Lina EL Bejjani, MD
FM

Ashraf Emara, MSN
HSON

Zein Farhat, MD
FM

Sarah Faour, MD
FM

Fatima Ghaddar, MD
FM/FHS

Elias Ghossoub, MD
FM

*Lana Hamieh, MD
FM
*SHARP Master of Sciences Candidates.
Founded in 2012, the Vascular Medicine Program (VMP) at AUB functions as a multidisciplinary unit that utilizes numerous clinical and research resources across campus, and is directed to promote vascular health and reduce the burden of cardiovascular diseases in Lebanon and the region.

The major aims of VMP are to screen and evaluate vascular diseases at AUBMC, unify evidence based guidelines in the treatment of vascular diseases, track and evaluate patient and physician compliance with evidence based practice in the prevention and treatment, and upgrade the current available IT resources and therapeutic/diagnostic technologies including outpatient monitoring and follow-up.

The program plans to develop a national database on cardiovascular diseases and is currently collaborating with Harvard School of Public Health (HSPH) and Lown Scholars Program at HSPH for capacity building in CVD research.

The CVD growing database will be a data source for SHARP trainees to conduct their research on CVDs and advocate for policy changes.
Outcomes Research Unit (ORU)

- The ORU aims at promoting clinical outcomes investigation and scholarly research, developing, managing and reporting on care delivery and performance improvement initiatives, and developing the tools for benchmarking the quality of healthcare delivery at AUBMC.

- It also aims to develop a flexible web-based software solution to build both clinical and research electronic databases for the various interested disciplines and subspecialties.

- ORU has partnered with SHARP and VMP to provide its expertise in training SHARP students on NCDs and providing the necessary IT expertise and platform for building the cardiovascular diseases database for the Vascular Medicine Program.
Center for Systematic Reviews on Health Policy and Systems Research (SPARK)

- It was established in 2013 funded by the Alliance for Health Policy and Systems Research at the World Health Organization (WHO).

- The Center is a joint collaboration between the Faculty of Health Sciences (FHS) and the Faculty of Medicine (FM).

- The mission of SPARK is to produce high-quality systematic reviews that respond to health policy and systems priority issues at the national and the regional level.

- The Center develops the capacity of young researchers in the Region in conducting systematic reviews of Health Policy and Systems Research on many topics including NCDs.

- SHARP trainees are required to take the course ”meta-analysis and systematic reviews” offered by faculty of this center prepare a comprehensive study on topics related to NCDs.
Future Directions for Research
Obesity and Metabolic Syndrome
(bone-fat connections)
Genetics Epigenetics
Increasing Prevalence of Obesity in the MENA

Akl et al, Journal of Nutrition and Metabolism 2012
Increasing Prevalence of Diabetes Mellitus in the MENA

Ak FL et al, Journal of Nutrition and Metabolism 2012