Breast cancer (BC) in Oman presents in advanced stages that has been attributed mainly to lack of awareness about breast cancer, cultural barriers, lack of screening programs, and late presentation. Therefore, efforts targeting early detection of breast cancer would be expected to play a major role in (a) reducing the stage of cancer at diagnosis, (b) improving the odds of survival and cure, as well as (c) applying a more cost-effective treatment.

In Oman, despite the utilization of the most advanced treatment modalities in breast cancer that includes surgery, chemotherapy, radiotherapy, and hormonal and targeted therapies, there has been less emphasis on implementation of strategies that increase awareness about breast cancer. The Success of early detection efforts have been associated with increased awareness among women toward available methods of early detection of BC, along with infrastructure for its diagnosis and treatment. Consequently, awareness programs should be directed toward educating and increasing awareness of women on symptoms of BC, assessment of breast changes, and available resources for early detection. Such educational programs should also involve health care providers, especially those who work in primary health care settings.

Therefore, the current study is needed given that breast cancer is the most common cancer in Oman with a trend of increasing incidence. Thus this study aims include obtaining baseline information on the current status of BC awareness among women in the several Omani governorates, with an ultimate goal to define strategies that can be implemented to increase the awareness about BC in order to facilitate early presentation and detection. More importantly, ensuring that the correct information reaches the society may help eradicating some of myths about BC and facilitate treatment in patients diagnosed with BC.

This is a multi-phase study that is built on the experience of the multidisciplinary team in the area breast cancer research, and it will lead to a larger scale randomized control trial that will be disseminated with the support with Omani national cancer association to different and more diverse population of women in Oman.

In Phase 1 (Exploratory Phase), using a stratified random sampling, 2000 adult Omani women from different governorates will be recruited. Those women will complete informed consent and baseline assessment of BC awareness. In Phase 2 (RCT Phase), data collected from first phase will guide the development and testing of a culturally tailored breast awareness intervention. In the end women in interventional group are expected to a) practice early detection of breast cancer, (b) report any changes in breasts to their health care providers, and (c) be aware of benefits of early detection of breast cancer and (d) aware of changes that can happen to their breasts.
Manufacturing of biologically active artificial bone with precise anatomical shapes and sizes

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Bone defects occur commonly as a consequence of loss/destruction from various pathological processes such as infection, deficient blood supply, tumors, and trauma. Replacement of these defects is currently an imprecise science biologically as well as mechanically. Biologically, an autograft or bone taken from the same patient from a different location is often the best option but the drawbacks are that it entails an additional surgical procedure with its attendant risks including infection, damage to surrounding structures such as nerves, blood vessels etc. Besides, there is a limit to the quantity of bone that could be safely ‘harvested’ or removed. Anatomically, it is difficult to create an exactly reciprocal shape and size from the harvested bone that would precisely fit the defect. The other options include allograft bone that is taken from an unrelated human donor. There are various drawbacks to this including risk of disease transmission, lack of biological activity, and the cost to name a few. The other options include artificial bone substitutes which mainly act as fillers or scaffolds. These typically lack mechanical strength and biological activity. Besides, it is difficult to give an exact shape and size that would be a perfect fit to fill the existing defect. Importantly, they lack biological activity. Therefore, there is a need for an artificial bone that has good mechanical strength, mechanical properties such as modulus of elasticity similar to bone, good biological activity, and can be made to fill the exact shape and size of the defect that exists.

Polyether ether ketone (PEEK) is a thermoplastic that has good mechanical strength, modulus elasticity similar to bone, and good biocompatibility. The only drawback is that it is bio-inert. In other words, it does not attract bone cells and therefore, does not integrate with the native bone. By blending PEEK with a material such as hydroxyapatite (HA), it may be possible to make the composite biologically active while maintaining the mechanical properties.

Additive manufacturing (aka 3d printing, powder metallurgy, rapid prototyping etc) is a rapidly developing manufacturing technique where precise shapes and sizes with a precise internal structure can be made by fusing individual particles of a material into a precise form by focusing an intense laser that melts the powder. The shape and size is controlled by the software which allows data from computerized tomography (CT) scans to be directly used to create the desired objects. Using PEEK powder for additive manufacturing has been a tremendous challenge because of the high melting point (over 300 degrees C) of PEEK. It is only in the last year or so that machines capable of using PEEK for additive manufacturing have been developed.

The aim of this project is to utilize additive manufacturing techniques to create artificial bone consisting of a blend of PEEK and HA made into precise shapes and sizes that could act as an artificial bone to precisely fill bone defects while maintaining the strength and encouraging integration of the artificial bone by enhancing its biological activity.
Identification of Novel therapeutic targets for inflammatory-associated human disorders

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Inflammation is a major hallmark of certain human chronic diseases including type 2 diabetes, obesity, autoimmune diseases and cancer. Detailed investigation of cellular inflammatory pathways help to understand disease process and progression. The Suppressors of Cytokine Signaling (SOCS) proteins act as negative regulators of the main cytokine and growth factor signaling pathways in multiple tissues and as such have important physiological functions. Recent studies demonstrated that inflammatory pathways might be regulated by the cellular actions of SOCS2. In this application we propose to study the molecular mechanism of SOCS2 regulation of inflammatory pathways. Mice will be used to investigate if enhanced GH signaling alter the function of immune cells isolated from wild-type and mice lacking SOCS2 SOCS2 knockout mice (SOCS2-KO). To dissociate the effects of increased growth hormone sensitivity on inflammatory pathways, we will analyze tissue specific knockout of SOCS2 through the use of LoxP-mice and chimera mice obtained from adaptive transfer of bone marrows between the wild-type mice and SOCS2 –KO mice. Plasma cytokines, phagocytic activities and gene expression will be used to investigate any difference in the function of immune system in all these mice models. We will further try to identify molecular targets of SOCS2 using quantitative proteomic approach. This proposal will present opportunities for future investigations aiming to increase understanding inflammatory processes in chronic human diseases such as type 2 diabetes and obesity. It will also provide a novel therapeutic target for treatment of inflammatory-associated diseases.
Social network systems are increasingly being used by governments to aid communication and improve services. This development provides some interesting areas of research with regard to the extent to which government departments and ministries are championing the use of social networks. Social network systems can be defined as ‘web-based services’ that allow individuals to construct a public or private profile within a bounded system, and to explore connections with others within the system. These networks play a vital role in many fields such as education, health and social marketing. The networks are useful for government agencies as they have many interactive and innovative features which aid communication and interaction between citizens.

This proposal sets out to introduce the ways in which SNS are being incorporated into the government departments. The main objective of this study is to investigate the adoption of social networking systems in government organizations, and their efforts in the race towards embracing them. It seeks to provide an outline of the current relevant literature regarding the categories, features and usage of social networking systems in order to provide real-life examples of governments that are embracing these technologies, and to discover what their experiences have been in doing so. Then, explore the national and international usage of social networking in governments agencies. Based on the findings of local, regional and international experiences build a framework as a guide for the government agencies to adopt in utilising social networking as a new media of communication with citizen and residence.
Assessment of Life Style: Physical activity, Nutrition Status, Sleep Duration, and BMI Among Schools’ Adolescents in Oman (14-18)

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In the past, life depended on rigorous physical activity both in occupation and recreation. Nevertheless, jobs and pleasure seeking life had drastically reduced exposure to physical activity and increased exposure to the availability of high-fats and dense-caloric foods, as a new trend influencing the life style. In addition, observation of physical education classes at the secondary stage in Oman assures the weakness of physical integration curriculum to healthy lifestyle. Such life style synergizes for developing hypokinetic related diseases (HRD) & noncommunicable diseases (NCDs) incidence. In this millennium active life style and physical activity are necessary for children especially teenagers and adolescents. Therefore, it is imperative to establish a base line data for male/female Omani national population between 14-18 yrs of old regarding healthy life style to combat HRD & NCDs. A school-based cross-sectional multicenter collaborative project will be adopted. The participants are adolescent males and females enrolled across secondary schools in Sultanate of Oman. The main purposes of this research proposal are to describe current patterns related to: (1) daily physical activity and regular exercise activity among Omani adolescents; (2) dietary patterns in respect of daily macro and micro nutrients intake and frequency of food consumption of Omani adolescents; (3) Body mass index (BMI), total body fat (TBF), Overweight and Obesity prevalence among Omani adolescents. It is also endeavor to investigate the associations between obesity measures and several lifestyle factors, including physical activity, sedentary behaviors sleep duration and dietary habits among Omani adolescents. Evaluation and examination of the data will be conducted also when comparing gender differences on the above variables. It is expected that the findings stemming from this strategic research endeavor will be substantial and very beneficial from public health perspectives. The results of this research will certainly supply us for the first time with a comprehensive and recent data on physical activity/inactivity patterns, eating habits, and sleep curtailment of Omani Adolescents, and their relationships to risk factors measures. Finally, this project will provide valuable baseline data for Ministry of education, Curriculum supervisors in PE, public health authorities and policy makers in the Sultanate of Oman, which are very essential for any strategy aimed at improving physical health education in schools and at preventing and controlling Hypokinetic and NCDs.
Characterizing the nature of resistance to Witches’ broom disease in Omani lime

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Acid lime (Citrus aurantifolia) is among the top four fruit crops in terms of production and area of cultivation in Oman. In the 1970s, disease symptoms were observed on lime trees in the northern part of the country. The symptoms were characterized by clustering of leaves, which become small in size and light green to yellow in color. Affected trees are usually killed within 5 years of appearance of symptoms. The disease, which was called witches’ broom disease of lime (WBDL), is caused by Candidatus Phytoplasma aurantifolia. It spread to other areas of the country and was reported in the UAE in 1989, in Iran in 1997, in India in 1999 and in Saudi Arabia in 2009. Loss of area cultivated with lime trees in Oman is currently 50% of that in 1990 and the disease wiped out over half a million lime trees in the country.

Studies by our research team in the past four years provided evidence that the low level of genetic diversity of acid lime in Oman and frequent movement of acid lime planting material across districts are two main factors which contributed to the spread and high susceptibility of acid limes to WBDL. A survey in 2009 and 2010 of 20,000 lime trees in Oman showed that the disease is present in most regions and farms, with only few asymptomatic lime trees which are 25-45 years old. It is not clear whether these lime trees have resistance to WBDL or that environmental factors play a role in suppressing disease symptoms.

The overall objective of this study is to characterize factors responsible for suppression of disease symptoms in lime trees infected with Phytoplasma. Another objective of the study is to develop a rapid protocol for detection of Ca. Phytoplasma aurantifolia in infected lime trees. Knowledge in these areas may help develop future management strategies for witches’ broom disease of lime in Oman and elsewhere.