出國報告（出國類別：開會）

食品及益生菌之現代影響和技術

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摘要

Scientific Federation 在全球各地專門負責計劃和執行各種領域的會議，Food Technology and Probiotics 是 Scientific Federation 每年度會舉辦的其中一場會議。第 4 屆的 Food Technology and Probiotics 主題是食品及益生菌之現代影響和技術，會議於 2019 年 10 月 24 日在泰國曼谷 The Sukosol Hotel 舉辦，進行食品及益生菌之學術交流，會議目的是希望世界各地的研究人員、國際社會和工業界領先者再次聚首討論最新動態，在食品科學家與食品工程師國際合作氛圍中促進食品技術及益生菌領域的創新。會議議程涵蓋食品技術與益生菌的最新國際動態，包含益生菌、微生物病原學、食品安全與保藏、蛋白質科學及糧食安全與營養不良等。此行也發表「The antimicrobial activity of lactic acid bacteria isolated from plants」，議程中獲得許多研究新知，未來能運用在益生菌相關研究及產品開發。

目次

一、 目的

第 4 屆的 Food Technology and Probiotics 主題是食品及益生菌之現代影響和技術 ，會議議程涵蓋食品技術與益生菌的最新國際動態，包含益生菌、微生物病原學、食品安全與保藏、蛋白質科學及糧食安全與營養不良等，其中益生菌與目前生技中心乳酸菌研究部分有相關。藉此行也發表「The antimicrobial activity of lactic acid bacteria isolated from plants」，議程中瞭解到益生菌及食品技術的最新研究及應用，並與國際學者間交流，未來能運用在益生菌相關研究及產品開發。參加此次研討會著重在食品與益生菌及食品防腐技術應用等相關研究議題，除此之外，也有其他相關領域，如微生物病原學及營養學，雖然目前研究方面並無太多交集，不過也可以根據其學術趨勢來做為未來研究方向參考的部分之一。

二、 過程

第 4 屆的 Food Technology and Probiotics 會議目的是希望世界各地的研究人員、國際社會和工業界領先者再次聚首討論最新動態，在食品科學家與食品工程師國際合作氛圍中促進食品技術和益生菌領域的創新。會議於 2019 年 10 月 24 日在泰國曼谷 The Sukosol Hotel 舉辦，議程共 1 天。其中，發表論文海報「 The antimicrobial activity of lactic acid bacteria isolated from plants」（圖 15），其他會議詳細議程如圖 11，會場場地如圖 12，會議過程中之照片如圖 14。參加此次研討會著重在食品與益生菌及食品防腐應用相關研究議題，下列針對食品與益生菌、食品防腐技術應用以及其他相關領域的研究議題詳述。

1. 食品與益生菌

乳酸菌在食品中的使用歷史悠久，是腸道中最具代表性的益生菌。乳酸菌可以維持菌群的平衡，並抑制腸道中病原菌的生長。乳酸菌還具有降低膽固醇，抗高血壓，治療尿路感染，減少過敏反應，預防蛀牙，保持健康皮膚等潛能。上述乳酸菌的功效主要來源於其二次代謝產物，如多醣、有機酸、聯乙酰、過氧化氫及細菌素等。許多研究表明、有機酸和細菌素具有抗微生物能力。用於代替食品或化妝品中的人工防腐劑。 中油生技 CPC102 是從蔬菜中分離出的一種乳酸菌，透過 Bauer-Kirby 塗盤擴散法測試了其抗菌作用。結果顯示，CPC102 可以抵抗革蘭氏陰性細菌，如大腸桿菌，綠膿桿菌和腸炎沙門氏菌。但對於革蘭氏陽性細菌、酵母菌和黴菌效果較不顯著。（圖 1）

The Antimicrobial Activity of Lactic Acid Bacteria Isolated from Plants

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Lactic acid bacteria have a long history of use in food, and are the most representative probiotics in the intestines. Lactic acid bacteria could maintain the balance of microflora and inhibit the growth of pathogenic bacteria in the intestinal tract. Lactic acid bacteria also have the potential to lower cholesterol, counter hypertension, treat urinary tract infections, reduce allergic reactions, prevent tooth decay, keep healthy skin, and so on. The efficacies of lactic acid bacteria mentioned above mainly stem from their secondary metabolites, such as polysaccharides, organic acids, diacetyl, hydrogen peroxide, reuterin, bacteriocins, etc . Many researches have showed that organic acids, reuterin and bacteriocins possess the antimicrobial ability which could be used to replace the artificial preservatives found in food or cosmetics. CPC102 is one of the lactic acid bacteria isolated from vegetables, and we tested its antimicrobial effects by Bauer-Kirby disk diffusion methed. The results revealed that CPC102 could against the gram negative bacteria, such as Escherichia coli, Pseudomonas aeruginosa and Salmonella enterica subsp. enterica, but not the gram positive bacteria, yeasts and molds.

圖 1、The antimicrobial activity of lactic acid bacteria isolated from plants

功能性食品始於 1980 年的日本，於 1991 年有書上指出某些食品對健康有益，並且證明了這種主張。FDA 於 1993 年在美國同意食品成分和病原體之間的關係，並在結果中證明了其有助於降低疾病風險的結果。世界糧食理事會（WFC）明確的定義了功能性食品為「除了營養價值外，還可以改善生理功能和健康的食品成分。」重要的是要解釋益生源和益生菌之間的區別。據了解，功能性食品、益生源及益生菌廣為人知的一些原因，如人們對食物和健康的認識增加，老年人的預期壽命的延長。以功能性食品的一些例子以及重要的益生源及益生菌定義來釐清了益生源和益生菌之間的差異，並解釋了食品中生物活性成分與食物及其食物來源的顏色之間的關係。（圖 2）

學者 Nassef 認為，「功能性食品、益生源及益生菌」是重要議題且影響許多領域，如衛生、工業及其他社會上與經濟上等部份。它代表了科學創造力的一個良好領域，對於科學研究領域的重要學者和研究人員是具吸引力的。

Functional Foods and Difference Between Probiotic & Prebiotic

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Functional foods began in Japan in 1980, in year 1991 which published that some foods have health benefits and it has been proved this claim. In America in 1993 it has been proven with results that it help in reducing the risk of diseases also the FDA agreed on the relationship between components of food and pathogens. The definition of functional foods and bioactive compounds pre- pro biotics .The World Council food information which cleared and defined functional food as "food ingredients that improve physiological function and health in addition to their nutritional value. Important to explain difference between Prebiotic and Probiotic , to know Some reasons for the spread of functional foods and pre- pro biotics like, increasing of awareness of food and health, increase in life expectancy for the elderly. Clearence of the difference between each of prebiotics and probiotics and showing some examples for functional food and important pre- pro biotics definitions. Also , explaining the relationship of the bioactive ingredients in food and color of food and its food sources.

From the above it is clear that "functional foods and pre- pro biotics " are sensitive issue and influential sectors of health, industry, directly and indirectly, and on the other sectors, multi economically and socially, as it represents a good area of scientific creativity should attract serious scholars and researchers in the field of scientific research.

圖 2、Functional Foods and Difference Between Probiotic & Prebiotic

通過摻入 *Bifidobacterium infantis* 和果膠來開發共生質優格（synbiotic yogurt）。分離 *Bifidobacterium infantis* 並在形態、生理、生化上進行表徵。在不同果膠濃度（即 0%，0.5%，1%和 1.5%）製備的優格中研究了 *Bifidobacterium infantis* 的生存力和存活率。對優格進行了活細胞計數、益生菌對胃液和膽汁鹽的耐受性、黏度、蛋白水解活性及感官評估的評估。（圖 3）

學者 Khan 認為在益生源存在下，益生菌的生存力和存活率增加。隨著處理之間果膠濃度的增加，黏度顯著增加。此外，隨著益生元濃度的增加，*Bifidobacterium infantis* 在模擬胃腸道條件下（pH 2，0.3%膽汁鹽）能夠很好地耐受，而果膠可以用作潛在的益生源，以提高益生菌的活力。

共生質不外乎就是提供益生菌足夠的益生源，讓益生菌能夠持續維持原本的活性甚至提升，因此若是開發乳酸菌相關產品，選擇良好的益生源可以讓益生菌效果增強。

Effect of Prebiotic on Viability and Survival of Probiotic (Bifidobacterium infantis) in synbiotic yoghurt

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Probiotic provides various health benefit to the host that's why probiotic based fermented food products gaining importance and acceptability worldwide. Among dairy based probiotic products yoghurt is one of them and have a strong market demand globally. Prebiotics selectively stimulate the growth and activity of probiotics. The present study was designed to develop synbiotic yoghurt with the incorporation of Bifidobacterium infantis and pectin. Bifidobacterium infantis was isolated and characterized morphologically, physiologically, biochemically. The viability and survival of Bifid bacterium infantis was studied in yoghurt prepared with different concentration of pectin i.e. 0%, 0.5%, 1% and 1.5%. Yoghurt was assessed for viable cell count, tolerance of probiotic to gastric juice and bile salt, viscosity, proteolytic activity and sensory evaluation. Results revealed that probiotic viability and survival increased in the presence of prebiotic and maximum survival was observed in T3 as compare to control. Viscosity increased significantly $P < 0.05$ as the concentration of pectin increased among the treatments. Furthermore, as the concentration of prebiotic increases Bifidobacterium infantis were able to tolerate well in simulated gastrointestinal conditions (pH 2, 0.3% bile salt). As far as sensory evaluation was concerned, among all the treatments, T2 assigned maximum score by the panelist. The current research findings revealed that the pectin can be used as potential prebiotic to improve viability of probiotics.

圖 3、Effect of Prebiotic on Viability and Survival of Probiotic (Bifidobacterium infantis) in synbiotic yoghurt

調查游離和微囊化益生菌在模擬胃腸道條件和甜菜根汁中的存活率，選擇 *Bifidobacterium longum*（BL-01）用於藻酸鹽殼聚醣生物聚合物（alginate chitosan biopolymer）的微囊化（microencapsulation）；在蔬菜中，甜菜根是抗氧化劑的良好來源，包括類胡蘿蔔素，類黃酮和酚類。在模擬胃液中，活菌計數顯著高於未包囊的益生菌。將游離或微囊化的益生菌細菌接種到甜菜根汁中，並在儲存 28 天期間評估其生存能力。還評估了產品在存儲過程中的理化性質（pH、酸度、糖度）、微生物分析和感官屬性。微囊化的益生菌在儲存 28 天后仍能存活，而游離的益生菌在儲存 1 週後喪失了生存能力。(圖 4)

學者 Yasmin 認為微囊化技術是提高發酵食品中益生菌存活率的一種有前途的技術，含有微囊化益生菌的果汁比含有游離益生菌的果汁更穩定。

目前生技中心的乳酸菌也有做化粧保養品原料之開發，不同產品類型，pH 不盡相同，像洗面乳的 pH 分布，酸性至鹼性都有，若要提高乳酸菌產物之可運用產品範圍，微囊化技術也是可以參考的方法之一。

Survival of Free and Encapsulated Probiotic in Beetroot Based Fermented Drink

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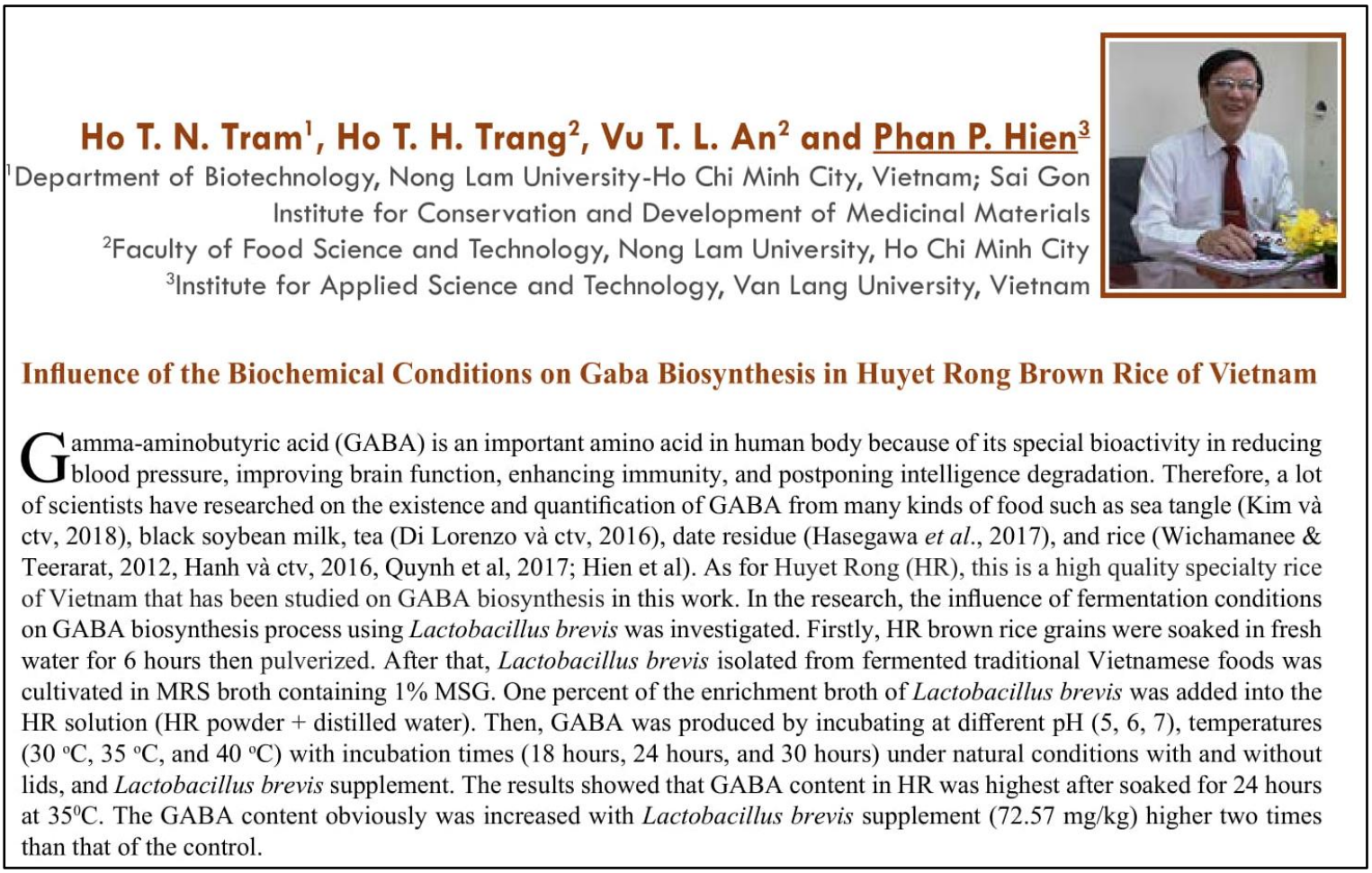
Trend is shifted towards new functional foods and beverage, which improves nutritional status and health of consumer. In this context, Probiotic functional food that promote health and well-being is a promising research priorities of food industry. Probiotics have been incorporated into different dairy products i.e. yoghurt, milk, ice cream, cheese and etc. Now a days, efforts are make to develop novel fruit and vegetable based fermented drink with Probiotics. Fruit and vegetables provides vitamin, mineral, fiber, antioxidant, phenolic compounds and etc. Among vegetables, beetroot are good sources of antioxidants including carotenoids, flavonoids and phenolics. The current study was design to investigate the survival of free and microencapsulated Probiotic bacteria in Simulated gastrointestinal condition and in beet root juices. Therefore, Bifidobacterium longum (BL-01) was chosen for microencapsulation with alginate chitosan biopolymer. It showed potential survivability in-vitro simulated gastrointestinal conditions. The survival rate of free and encapsulated probiotic was 106 Log CFU/ml and 109 Log CFU/ml, respectively. The viable count was significantly higher than non-encapsulated probiotics in simulated gastric juice. The free or microencapsulated probiotic bacteria were inoculated into beet root juice and their viability was assessed during 28 days of storage. The product was also evaluated for its physicochemical (pH, acidity, Brix), microbiological analysis (Total plate count) and sensory attributes during storage. Microencapsulated Probiotics survive after 28 days of storage while free Probiotics lost their viability after 1 week of storage. In general, juice containing microencapsulated Probiotic bacteria were more stable than those containing free Probiotic organisms. So, microencapsulation is a promising technique to improve survival of Probiotics in fermented foods.

圖 4、Survival of Free and Encapsulated Probiotic in Beetroot Based Fermented Drink

以一種越南當地的糙米(huyet rong brown rice)經過乳酸菌 *Lactobacillus brevis* 發酵過後，在條件較缺氧的環境下、35℃下 24 小時以及 pH6 來發酵產生 GABA。（圖 5）

學者 Phanphuoc 發現在最佳條件下會有最大產率為 78.04mg/kg。

中油生技也有申請 *Lactobacillus sp.* 乳酸菌產 GABA 專利，可以參考學者 Phanphuoc 的最適條件來測定是否也能提高產率以提升技術品質。



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Influence of the Biochemical Conditions on Gaba Biosynthesis in Huyet Rong Brown Rice of Vietnam

Gamma-aminobutyric acid (GABA) is an important amino acid in human body because of its special bioactivity in reducing blood pressure, improving brain function, enhancing immunity, and postponing intelligence degradation. Therefore, a lot of scientists have researched on the existence and quantification of GABA from many kinds of food such as sea tangle (Kim và ctv, 2018), black soybean milk, tea (Di Lorenzo và ctv, 2016), date residue (Hasegawa *et al*., 2017), and rice (Wichamanee & Teerarat, 2012, Hanh và ctv, 2016, Quynh et al, 2017; Hien et al). As for Huyet Rong (HR), this is a high quality specialty rice of Vietnam that has been studied on GABA biosynthesis in this work. In the research, the influence of fermentation conditions on GABA biosynthesis process using *Lactobacillus brevis* was investigated. Firstly, HR brown rice grains were soaked in fresh water for 6 hours then pulverized. After that, *Lactobacillus brevis* isolated from fermented traditional Vietnamese foods was cultivated in MRS broth containing 1% MSG. One percent of the enrichment broth of *Lactobacillus brevis* was added into the HR solution (HR powder + distilled water). Then, GABA was produced by incubating at different pH (5, 6, 7), temperatures (30 °C, 35 °C, and 40 °C) with incubation times (18 hours, 24 hours, and 30 hours) under natural conditions with and without lids, and *Lactobacillus brevis* supplement. The results showed that GABA content in HR was highest after soaked for 24 hours at 35°C. The GABA content obviously was increased with *Lactobacillus brevis* supplement (72.57 mg/kg) higher two times than that of the control.

圖 5、Influence of the Biochemical Conditions on Gaba Biosynthesis in Huyet Rong Brown Rice of Vietnam

2. 食品防腐技術應用

利用低溫電漿（cold plasma）作為新興消毒法來復原已受感染之植物材料，如種子、食物及食物香料等，本研究利用 Dielectric Barier Discharge (DBD) Plasma 方法，挑選像 *Fusarium spp.*或 *Alternaria spp.*等致病菌株，並選用乾燥巴西里香菜來測試，經過各種暴露時間及功率下，結果發現大部分微生物生長及發展均遭受抑制。（圖 6）

學者 Panka 認為低溫電漿有望成為植物材料去汙染之技術。

低溫電漿目前已廣泛應用於光電半導體、3C 電子及工業零組件等產業。若將此技術應用於食品原料甚至化妝品原料，殺菌過程為乾式處理，或許能減少防腐劑之使用量，而且處理效率佳，或許是可以創造產業價值的技術。

Research on use of Cold Plasma for Disinfection of Plant Material

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Non-thermal plasma refers to a partially or wholly ionized gas consisting of positive and negative ions, photons, free radicals, electrons as well as atoms in their fundamental or excited states created at low pressure, usually atmospheric. Due to its properties plasma is referred to as the fourth state of matter. For the production of non-thermal plasma, special generators are used, eg. corona discharge, dielectric barier discharge, etc. Ionized plasma particles easily react with various chemical substances. This allows to destroy microorganisms and influence their biological structures and DNA. Ozone, nitrous oxide and hydrogen peroxide are particularly active. Literature reports on the influence of non-thermal plasma on the growth and development of microorganisms are fragmentary. Therefore, research was undertaken to determine the potential of cold plasma as emerging disinfection method that offers reduction of microbial populations in contaminated plant material such as seeds, food, plant spices. A patent pending prototype of the device for generating and applying Dielectric Barier Discharge plasma (DBD) was used in the research. The survival and development of selected microorganisms, eg. *Fusarium* spp., *Alternaria* spp., were analyzed in laboratory conditions, under varied exposure times and generator power. Detailed research on the use of DBD plasma for disinfection of dried parsley were also conducted. Differentiation in the reaction of the investigated microorganisms to non-thermal plasma was observed. Growth and development of some microorganisms were inhibited in high extent. Use of cold plasma is a promissing technology of decontamination of different plant material.

圖 6、Research on use of Cold plasma for Disinfection of Plant Material

3. 其他相關領域

將烏龍茶發酵後的酶進行固定化的微波處理，微波處理過的樣品中單寧的濃度（23.14%）高於傳統焙烤樣品中的單寧濃度（21.10%），剩餘總多酚含量也較高，而剩餘的 PPO（多酚氧化酶）活性則較低。（圖 7）

學者 Phanphuoc 則建議最佳條件是功率為 630 W，輻射時間為 190 s，樣品加載密度為 0.06 g.cm-2，不過尚需要改善微波處理茶的風味。

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Use of Microwave Treatment for Fixation of Polyphenol Oxidase in Processing Oolong Tea in Vietnam

This study was aimed to optimize a microwave treatment to fix enzymes after Oolong tea fermentation based on concentrations of tannin, total polyphenols and the remaining activity of PPO (polyphenol oxidase) enzyme. Three factors including power levels (540 - 720W), radiation time (160-195 sec) and sample loading density (0.026-0.078 g.cm-2) were considered for the optimization. Results showed that the optimal conditions were at power of 630 W, radiation duration of 190 s and the sample loading density of 0.06 g.cm-2. At these conditions, dry matter of treated tea had 23.14% tannin, and 24.10% total polyphenols, and the remaining activity of PPO was at 11.19%. The concentrations of tannin of the samples treated by microwave were higher than those of the conventionally roasted sample (21.10%). Remained total polyphenols of the former were also higher and the remaining PPO activity was lower. The color of the microwave-treated sample was better whereas the flavor and taste were less preferred as compared to the onventionaltreated tea. The results showed that microwave had high potential to inactivate enzymes in fermented tea. However, flavor and taste of the microwave-treated tea needs to be improved.

Keywords: Enzyme inactivation; Polyphenols; Tannin; Oolong

圖 7、Use of Microwave Treatment for Fixation of Polyphenol Oxidase in Processing Oolong Tea in Vietnam

鎂和維生素 D 缺乏之間存在很強的相關性。與單獨補充維生素 D 相比，補充鎂和補充維生素 D 可以更有效地糾正維生素 D 缺乏症。（圖 8）

學者 Haq 建議每餐考慮添加 550 毫克葡萄糖酸鎂。鎂的體內穩態通過腸道，骨骼和腎臟之間的微妙相互作用來維持。鎂是維生素 D 合成和活化的重要輔助因子，反過來又可以增加腸道對鎂的吸收並建立前饋迴路（feed-forward loop）來維持其體內穩態。其中一種營養素失調都可能造成骨骼畸形、心血管疾病和代謝綜合症。

Afrozul Haq

Jamia Hamdard (Hamdard University), India

How Important is Magnesium as a Cofactor for the Activation of Vitamin D?

The adequate balance of magnesium and vitamin D is essential for maintaining the physiologic functions of various organs. Vitamin D helps regulate calcium and phosphate balance to maintain healthy bone functions. Skeletal muscles, heart, teeth, bones, and many other organs require magnesium to sustain their physiologic functions. Abnormal levels in either of these nutrients can lead to serious organ dysfunctions. All of the enzymes that metabolize vitamin D seem to require magnesium, which acts as a cofactor in the enzymatic reactions in the liver and kidneys. A strong correlation exists between Mg & vitamin D deficiency. Mg supplementation, taken along with vitamin D supplementation, was more effective at correcting a vitamin D deficiency than vitamin D supplementation alone. Consider Mg Gluconate 550 mg supplement with each meal. Mg homeostasis is maintained by the delicate interactions of the intestine, bone, and kidney. Magnesium is an essential cofactor for vitamin D synthesis and activation and, in turn, can increase intestinal absorption of magnesium and establish a feed-forward loop to maintain its homeostasis. Dysregulation in either of these nutrients can be associated with various disorders, including skeletal deformities, cardiovascular disorders, and metabolic syndrome. Magnesium is an essential cofactor for vitamin D synthesis and activation and, in turn, can increase intestinal absorption of magnesium and establish a feed-forward loop to maintain its homeostasis.

圖 8、How Important is Magnesium as a Cofactor for the Activation of Vitamin D？

取 61 份唾液樣本，其中有多個年齡組的有或沒有牙周疾病的患者，該研究包括常規培養方法，差異檢測以檢測酶脲酶。（圖 9）

學者 Henriques 認為牙周炎患者的病例以及衛生程度與幽門螺桿菌的存在相關。

Corsina Velazco Henriques

Jubilee of the Institute University of Health Sciences, Portugal

Is the Stomach or Oral Cavity the Helicobacter Pylori Reservoir in Man?

The stomach is attributed to the reservoir of Helicobacter pyrlori, an etiologic agent of acute or chronic gastritis associated with severe pathologies such as peptic ulcer, gastric cancer, lymphoma of lymphoid tissue. Recent studies have put the hypothesis of being the oral cavity the ideal reservoir of the bacterium by the environmental conditions of microaerophilia, nutrients such as glycoproteins, essential moisture ions, pHcalcalino, dental biofilm as a surface of adherence. In this study, 61 saliva samples were studied from patients with or without periodontal disease of several age groups selected from theDental Clinical of the University Institute of Health Sciences, Gandra Porto, Portugal. The study included, conventional methods of culture, differential testing to detect enzyme urease. In a later study, PCR-RFLP amplicon (Restriction Fragment, Length Polymorphism) was used to visualize positive, the negative, and inconclusive samples in the PCR and PCR-RFLP positive sample (CIP 11260) with periodontitis and 4 positive patients without periodontitis.

The results obtained using PCR in patients with and without periodontitis were 6 positive, 3 and 3 respectively. The results with PCR-RFLP were 3 positive in patients with periodontitis and 4 in patients without periodontitis in the 61 samples studied.

Conclusions: 1. In the cases considered positive, two specific genes of H.p., 2. inconclusive cases need to be reevaluated by specific targets of H. pylori, 3.The cases of individuals with periodontitis and the degrees of hygiene, moderate or poor hygiene were correlated with the presence of H. pylori.

圖 9、Is the Stomach or Oral Cavity the Helicobacter Pylori Reservoir in Man？

學者 Suzuki 認為儘管維生素 E 缺乏症可能引起流產，神經功能障礙，肌病和紅細胞壽命縮短，但流行病學研究表明維生素 E 缺乏症對瘧疾感染具有有益作用。α-TTP 是循環中維生素 E 水平的決定因素，動物實驗顯示，α抑制-TTP 賦予抗瘧疾感染的能力，並伴隨由維生素 E 缺乏引起的氧化應激誘導的寄生蟲 DNA 損傷。Probucol 是一種新近發現的藥物，可引起循環中維生素 E 缺乏，並有效抵抗鼠類瘧疾。而維生素 E 缺乏症的保護作用可能會擴展到控制其他原生動物寄生蟲。（圖 10）

Induced Vitamin E Deficiency Confers Resistance Against Murine Malaria Infection

Hiroshi Suzuki
Obihiro University of Agriculture and Veterinary Medicine, Japan

Nutrition might be one of the numerous biological, immunological, and ecological factors that influence the adaptation of human population to malarial infection. Although vitamin E deficiency may cause abortion, neurological dysfunction, myopathies, and diminished erythrocyte lifespan, epidemiological studies have suggested beneficial effects of vitamin E deficiency on malaria infection. However, it has not been clinically applicable for the treatment of malaria owing to the significant content of vitamin E in our daily food. Since α-tocopherol transfer protein (α-TTP) has been shown to be a determinant of vitamin E level in circulation, however, manipulation of vitamin E levels by α-TTP inhibition was considered as a potential therapeutic strategy for malaria. Knockout mice showed that inhibition of α-TTP confers resistance against malaria infections, accompanied by oxidative stress-induced DNA damage in the parasite, arising from vitamin E deficiency. Combination therapy with chloroquine and α-TTP inhibition significantly improved the survival rates in mice infected with malarial parasites. Thus, clinical application of vitamin E deficiency could be possible, provided that vitamin E concentration in circulation is reduced. Probucol, a recently found drug, induced vitamin E deficiency in circulation and was effective against murine malaria. Currently, treatment of malaria relies on the artemisinin-based combination therapy (ACT); however, when mice infected with malarial parasites were treated with probucol and dihydroartemisinin, the beneficial effect of ACT was pronounced. Protective effects of vitamin E deficiency might be extended to manage other protozoan parasites.

圖 10、Induced Vitamin E Deficiency Confers Resistance Against Murine Malaria Infection

三、 心得及建議

益生菌 (Probiotics) 已被證實是腸內的有益細菌，可以清除壞菌，也能改善人體免疫能力。人體腸胃內細菌種類可能超過 500 種。益生菌 (Probiotics)的定義是含有足量可以改變宿主胃腸道菌叢而產生有益健康效果的活性微生物製品。其中乳酸桿菌或比菲德氏菌 (Bifidobacterium)最被廣泛地使用。益生菌於食品中應用已經有多年的歷史，隨著科技的提升，更能將益生菌的功能性廣泛應用在更多領域。

本次會議主要心得為瞭解世界學者目前對於益生菌與食品的研究進展及應用。本公司中油生技目前擁有 124 株乳酸菌菌庫，其中 CPC101 乳酸菌的發酵液具有抑制革蘭式陰性菌生長，菌株是從蔬菜中篩選出來的，未來也許可以應用在食品中甚至化粧品中的防腐劑，因此乳酸菌如何應用是本次關注的部分。

學者 Khan 認為在益生源存在下，益生菌的生存力和存活率增加，利用共生質 (synbiotic)的方式，讓優格中的益生菌活性提升，而共生質讓益生菌能夠持續維持原本的活性甚至提升，因此若是開發乳酸菌相關產品，選擇良好的益生源可以讓益生菌效果增強。

學者 Yasmin 利用微囊化(microencapsulation)方式提升乳酸菌於食品中之存活率，目前生技中心的乳酸菌也有做化粧保養品原料之開發，微囊化技術也是可以參考的方法之一。

學者 Phanphuoc 以一種越南當地的糙米(huyet rong brown rice)經過乳酸菌 Lactobacillus brevis 發酵過後，在條件較缺氧的環境下、35℃下 24 小時以及 pH6 來發酵產生 GABA，發現在最佳條件下會有最大產率，而目前中油生技也有申請 *Lactobacillus sp.* 乳酸菌產 GABA 專利，可以做為參考以提升技術品質。

在食品防腐技術部分，學者 Panka 利用低溫電漿作為新興消毒法來復原已受感染之植物材料，若將此技術應用於食品原料甚至化妝品原料之消毒，或許待技術成熟時，能夠降低生產原料之成本。

本次研討會與各學者之交流中獲益良多，對於益生菌與食品及食品防腐技術之應用有更進一步的認知，若未來有機會發展乳酸菌相關原料或產品可作為參考方向之一。

附錄

Day 1 October 24, 2019	
Main Hall	
08:00-09:30	Registrations
09:30-10:00	Introduction & Opening Words
Plenary Forum	
10:00-10:50	Title: Use of Microwave Treatment for Fixation of Polyphenol Oxidase in Processing Oolong Tea in Vietnam & Title: Influence of the Biochemical Conditions on Gaba Biosynthesis in Huyet Rong Brown Rice of Vietnam Hien Phan Phuoc, Van Lang University, Vietnam
10:50-11:40	Title: Is the Stomach or Oral Cavity the Helicobacter Pylori Reservoir in Man? Corsina Velazco Henriques, Jubilee of the Institute University of Health Sciences, Portugal
	Refreshments Break 11:40-11:55 @ Foyer
11:55-12:45	Title: How important is Magnesium as a Cofactor for the Activation of Vitamin D? Afrozul Haq, Jamia Hamdard (Hamdard University), India
12:45-12:55	Group Photo
	Lunch Break 12:55-14:00 @ Restaurant
Oral Talks	
Session	Probiotics, Functional Foods in Economy and Business | Microbial Pathogenesis | Food Safety, Preservation, Quality Standard and Systems Management | Sustainable Food Security | Protein Science | Food Security and Malnutrition | Nutritional Deficiencies and Nutraceuticals | Trends in Modern Food Processing | Public Health Nutrition
Session Chair	Hien Phan Phuoc, Van Lang University, Vietnam
14:00-14:40	Title: Induced Vitamin E Deficiency Confers Resistance against Murine Malaria Infection Hiroshi Suzuki, Obihiro University of Agriculture and Veterinary Medicine, Japan
14:40-15:20	Title: Reducing Sugar Content and Calories of Drinks through Functional Ingredients Mahmoud Ghorbani, Partak Food Innovation Group, Iran
15:20-16:00	Title: Research on Use of Cold Plasma for Disinfection of Plant Material Dariusz Pańka, UTP University of Science and Technology, Poland

圖 11、研討會詳細議程

圖 12、研討會會場

圖 13、與其他參與者合影

圖 14、研討會議程進行

圖 15、論文海報 The antimicrobial activity of lactic acid bacteria isolated from plants 發表及展示會場