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Sub: Acceptance for Chapter entitled **“Improving the Tumor Avidity of Photosensitizers Used in the Photodynamic Therapy (Pdt) of Cancers: Current Approaches”**.


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Dear Sir/ Mam,

It gives me immense pleasure to inform you that the chapter entitled **“Improving the Tumor Avidity of Photosensitizers Used in the Photodynamic Therapy (Pdt) of Cancers: Current Approaches”**, written by **Ms. Ankita H. Tripathi, Ms. Ankita Bhatt, Ms. Amrita Kumari, Ms. Himani Tewari, Mr. Rishendra Kumar, Mr. Santosh K. Upadhyay** of Dept. of Biotech., Sir J.C. Bose Technical Campus, Kumaun University and **Ms. Garima Chand, Penny Joshi** of Dept. of Chemistry, DSB Campus, Kumaun University, Uttarakhand. The content is proceeded to the formatting and publication section. It is under publication in the book entitled **“Recent advances in Cancer Biology”**, written by **Dr. Kanchan Karki and Mr. Jeetendra Singh Bohra** from Uttarakhand Biotechnology Council, Haldi, Uttarakhand with the **ISBN 978-81-929995-9-3**.

With regards,



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Improving the tumor avidity of Photosensitizers used in the photodynamic therapy (PDT) of Cancers: Current Approaches

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1. Introduction

Light has been used as medical aid for over 3 thousand years [1]. Ancient Indian, Egyptian, and Chinese civilizations have been using light for treatment of diverse ailments, including various skin problems, rickets, carcinomas etc [2]. Similarly, in Denmark at the end of 19th century, Niels Finsen developed a technique called ‘phototherapy’. He used red-light to treat smallpox and observed that on exposure to red light the development and liberation of smallpox pustules were prevented. He extensively utilized ultraviolet radiation from the sun light to deal with cutaneous tuberculosis [3]. For this discovery, using phototherapy for treatment of diseases, Niels Finsen was awarded a Nobel Prize in 1903[4]. More than a hundred years ago, scientists have found that a concoction of various chemicals with light could induce cell death. In 1900, Oscar Raab found that different wavelength of light in combination with acridine was lethal to different species of Paramecium and infusoria respectively [5]. Similarly, H. V. Tappeiner and A. Jesionek (1903) used a combination of white light and eosin to treat skin tumors. This phenomenon was called as photodynamic action [6]. Research for testing combinations of various reagents and light resulted into development of modern method of photodynamic therapy (PDT) [4]. The process of PDT involves use of two components that are non-toxic and function in an oxygen dependent manner. The first component is a photosensitizer, and the second component is light (various wavelengths). The photosensitizer is localized to a target tissue or cell and is activated using appropriate light of specific wavelength. The application of light activates the sensitizer, which then transfers its energy to oxygen molecules resulting in generation of reactive oxygen species (ROS), which induces necrosis or apoptosis inside the cell, ultimately leading to the death of cancerous and non-malignant cells [7]. Studies revealed that on exposure to light, the photosensitizer gets excited and produces free radicals and

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Bacteria-derived luminescent carbon quantum dots for antibacterial activity

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ABSTRACT

Recently, carbon quantum dots (CQDs) with a particle size range of less than 10 nm have been emerged as a new class of fluorescence carbon nanomaterials. These materials can also be functionalized with biomolecules so these can be used as effective carriers for drug delivery, bio-imaging, and also their size and other features make them promising materials to be used in sensors and electrochemical luminescence. Recent advancements show that these fluorescent carbon nanomaterials exhibit great potential for sensing and killing microorganisms. Herein, we report a one pot hydrothermal synthesis of carbon quantum dots from bacteria optimizing different temperature, time and material for functionalization. The obtained carbon dots were further characterized by transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS), Fourier transform infrared spectrophotometry (FTIR) and Photoluminescence spectra (PL). In addition to the synthesis these nanomaterials are used to check their bactericidal activities against both gram-negative bacteria like *Salmonella typhi* and gram positive bacteria like *Bacillus subtilis* strain. As compared to the broadly used antibiotics developed CQDs (carbon quantum dots) have advantages over them including lower cytotoxicity, excellent photo-stability and high selectivity. Due to the simple method of synthesis, low cost and eco friendliness these unique materials would certainly be used further in future for different biological applications.

Synthesis and characterization of novel heterocyclic 2-Aminopyrimidine Schiff bases as fungitoxic agents.

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ABSTRACT

2-Aminopyrimidine is a derivatizing agent which can be used as a fluorescent label for oligosaccharide detection, in chromatographic separation, fluorometric and mass spectrometric analysis. 2-Aminopyrimidine and its derivatives are good candidates for antimicrobial, antifungal and anticorrosion activity. In the present study, a series of substituted *N*-benzylidene-2-aminopyrimidine compounds were synthesized by condensation reaction of 2-aminopyrimidine with substituted benzaldehydes (*o*-chloro, *m*-hydroxybenzaldehyde, *p*-hydroxybenzaldehyde, 2,5-dimethoxybenzaldehyde, *p*-dimethylaminobenzaldehyde, syringaldehyde, *o*-phthaldehyde, isovanillin benzaldehyde, veratraldehyde and thiophene-2-carboxyaldehyde). The obtained Schiff bases were characterized using UV, IR, ¹H NMR and ¹³C spectral studies. The antifungal activity of all the synthesized Schiff bases was screened against *Fusarium verticillioides*, *Macrophomina phaseolina*, and *Rhizoctonia solani* using poisoned food technique. The compound with *p*-dimethyl aminobenzaldehyde showed maximum inhibition and least inhibition was shown by syringaldehyde with respect to carbendazim at 50 WP as control against the three fungus. Thus, in future, this kind of pyrimidine derivatives may be used to generate better fungicides with improved fungicidal activities.

Utilization of shrimp shell meal derived natural astaxanthin with its synthetic variant enhanced antioxidative status and immune responses in *Symphysodon aequifasciatus* (Pellegrin, 1904)

Ramjanul Haque*, Paramita Banerjee Sawant, Parimal Sardar, Tincy Varghese, K.A Martin Xavier, and Narinder Kumar Chadha

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ABSTRACT

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Endemic Burkitt's Lymphoma (eBL) is a pediatric cancer associated with morbidity and mortality among children resident in holoendemic *Plasmodium falciparum* regions, such as western Kenya. *P. falciparum* infections share a causal link with Epstein Barr virus (EBV) infection. Moreover, *P. falciparum* has exerted a strong selection pressure on sickle cell trait, alpha (α)-thalassemia, glucose-6-phosphate dehydrogenase (G6PD), and merozoite surface protein 2 (MSP-2) genes to confer reduced malarial disease severity. The current study investigated the impact of polymorphisms in those genes on susceptibility to EBV in children (aged 0-36 months, n=81) resident in western Kenya enrolled into a longitudinal study. Clinical, demographic, and sample collection was performed at enrolment and 6 mos. post-enrollment. Bivariate regression analyses revealed that carriage of sickle cell trait (SCT, HbAA), α -thalassemia heterozygosity, and G6PD mutations [Mahidol (487G>A)/Coimbr (C592T), the Viangchan (871G>A)/Chinese (1024C>T) and the Canton (1376G>T)/Kaiping (1388G>A)] were not associated with acquisition of EBV either before or after 6 mos. of age. Additional bivariate analysis of infants <6 mos. of age illustrated that exposure to either 3D7 ($p=0.921$) or FC27 ($p=0.914$) MSP-2 alleles was not protective against EBV acquisition. Exposure to the MSP-2 alleles (3D7, FC27, or both) in children aged ≥ 6 months also had no impact on EBV acquisition ($p=0.108$; $p=0.754$; $p=0.357$, respectively). In conclusion, results presented here show that variation in SCT, α -thalassemia, G6PD variants, and exposure to MSP-2 (FC27, 3D7) had no impact on susceptibility to EBV in children from this holoendemic region of western Kenya.

0619

DIAGNOSIS OF MALARIA IN CAMEROON: A NEED FOR ADDRESSING NON-FALCIPARUM MALARIA!

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Plasmodium falciparum (*Pf*) is commonly thought as the dominant malaria species in sub-Saharan Africa (sSA) countries. However, recent studies reported high prevalence of yet neglected non-falciparum species in Cameroon, which are still largely understudied in the country. The performances of a commonly used *Pf*-detecting rapid diagnostic test (RDT) were determined in 355 symptomatic individuals aged 1-65 years living in the town of Douala. The RDT reliability was evaluated using light microscopy (LM) as gold standard method. Polymerase chain reaction (PCR) of the *Plasmodium* 18S gene was performed for samples for which results between LM and RDT were discordant (i.e., False negative-RDT-/LM+, and False positive-RDT+/LM-). The PCR amplicons of non-falciparum species were sequenced and BLASTed. The sensitivity and specificity of *Pf*-detecting RDT was 94.0 % and 66.7 %, respectively. Thirty discordant results between LM and RDT were found viz. 25 LM+/RDT-, and 5 LM- / RDT+. The 18S PCR analysis for the 25 RDT-/LM+ samples revealed that 5 and 20 were positive for *P. ovale curtisi* (*PoC*) and *Pf*, respectively. All *PoC* cases were found in children below five years as mono-infections. Regarding the five RDT+/LM- samples, PCR was negative for all human

malaria species. *PoC* sequences were found to be phylogenetically closer to sequences reported from China-Myanmar border and Malaysia. This is the first report on molecular characterization of *P. ovale* subspecies in Cameroon. The study also outlines the good diagnostic performances of the *Pf*-detecting RDT. However, the presence of *PoC* in false negative RDT results highlights a need to pay attention non-falciparum species for a better management of malarious patients in Cameroon.

0620

HIGH PREVALENCE OF SUBMICROSCOPIC MALARIA INFECTION IN PEOPLE LIVING WITH HIV/AIDS ON ART AND COTRIMOXAZOLE PROPHYLAXIS IN FAKO DIVISION, SOUTH WEST REGION OF CAMEROON

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Malaria and HIV coinfection is common in sub-Saharan Africa (SSA). However, epidemiological surveys using light microscopic detection of the malaria parasites frequently report prevalence lower than that of the general population. Studies suggest that the lower prevalence of malaria among people living with HIV/AIDS (PLHIV) could be attributed to the ART and cotrimoxazole prophylaxis they are routinely on. However, studies using molecular diagnostic methods to detect malaria parasites in PLHIV are also not readily available. This study was designed to compare light microscopy and PCR in the detection of malaria parasites in PLHIV and on ART and cotrimoxazole prophylaxis in Fako Division of Cameroon. PLHIV were enrolled from selected HIV treatment centers in Fako Division, Southwest region of Cameroon. Screening for malaria parasites was done using microscopic examination of Giemsa-stained blood films. And the results were confirmed by multiplex PCR. In all, 404 samples were analyzed, from 315 (78.0%) females and 89 (22.0%) males. A majority (84.2%) of the participant were on first line ART and all (100%) were on cotrimoxazole prophylaxis. Of the 404 participants, 7 (1.7%) and 82 (20.3%) were positive for malaria parasites by light microscopy and multiplex PCR respectively. The mean (\pm SD) parasite density was 191.57 \pm 159.51 parasites/ μ l. The prevalence of submicroscopic malaria parasites was therefore 19.1% (77/404). All (100%) the positive cases by light microscopy and confirmed by PCR, were *Plasmodium falciparum*. Meanwhile PCR detected 51 (62.2%) *P. falciparum*, 9 (11.0%) *P. malariae* and 13 (15.9%) *P. falciparum* + *P. malariae* coinfection. This study revealed a high prevalence of submicroscopic malaria parasites in the target population. The findings have significant epidemiological implications and warrants the need for the evaluation of current malaria diagnostic protocols in PLHIV and on treatment

0621

DETECTION OF MALARIA AS A MAJOR CAUSE OF ACUTE FEBRILE ILLNESS: FINDINGS FROM AN ACUTE FEBRILE ILLNESS SURVEILLANCE ACTIVITY IN TWO URBAN HEALTH FACILITIES IN LIBERIA

Madeline R. Farron¹, Elijah Paa Edu-Quansah², Amanda Balish¹, G. Burgess Gbelee Jr³, Terrence Lo¹, Daniel W. Martin¹, Gulu Gwesa⁴, Denise Roth Allen⁴, Maame P. Amo-Addae², Ashaba Davis⁵, John B. Dogba³, Fahn M. Taweh³, Lekilay Tehmeh⁶, Thelma V. Nelson⁷, Diabe Dore⁸, Williamatta S. Williams-Gibson⁹, Michael Aidoo¹, Darwin J. Operario¹⁰, Jie Liu¹⁰, Eric Houpt¹⁰, Adam L. Cohen¹, Marta A. Guerra¹, Mamadou O. Diallo⁴, Desmond Williams⁴

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OP-77

Source-specific variability in fatty acids, phytochemicals, and antioxidant activity in *Prinsepia utilis* Royle

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Abstract

Environmental factors generally influence phytochemicals quality and quantity. The plants of *Prinsepia utilis* grows on the Himalayan region where environmental and microclimatic conditions varied significantly, and that influence the phytochemicals and antioxidant activities of the species. The present study evaluate the influence of environmental factors such as altitude and edaphic factors on phytochemicals in seeds and pulp of *Prinsepia utilis*. *Prinsepia utilis* is one of the known wild edible has a great importance in cosmeceuticals, edible oil and traditionally used in skin diseases and rheumatic pain. The fatty acid composition of seeds varied across the altitude. The higher altitude populations shows rich in polyunsaturated fatty acid (PUFA), while the saturated fatty acid (SFA) was higher at lower altitude populations. Similarly, total phenol and flavanoids in pulp was higher at lower altitude populations; however, antioxidant activity measured by 2, 2-azinobis (3-ethylbenzothiazoline-6-sulphonic acid) (ABTS) was higher at higher altitude. The ferric reducing antioxidant power (FRAP) was found higher at middle altitude. Edaphic factors when corelated with phytochemicals and fatty acids showed negative corelation with the soil nutrients. For example, soil moisture showed a significant positive relationship with total phenols ($p < 0.05$), whereas significant ($p < 0.05$) negative relationship with FRAP antioxidant activity was recorded. Similarly available nitrogen showed significantly ($P < 0.05$) but the negative connection with cis-11-Eicosenoic acid, methyl ester (FA10; $P < 0.001$), Docosanoic acid, methyl ester (FA11; $P < 0.05$), Heptadecanoic acid, methyl ester (FA14; $P < 0.05$), and Tricosanoic acid, methyl ester (FA29; $P < 0.05$). The study concluded that the identification of the fatty acids, and antioxidant rich populations at diverse altitudinal range in the Himalayan region can be propmoted for its mass plantation at wasteland as the species is known for it soil binding ability and also can be utilized for its bioactive potential. Since the fruits are the source of phtochemicals and antioxidant activities, the same can be utilized in nutraceuticals and cosmeceuticals industries.

Key-words: Phytochemicals, antioxidant

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23. 21वीं सदी में भारत में पर्यावरणीय गवर्नेन्स एवं धारणीय विकास : उपशीर्षक (शोध लेख) (विकास, संक्रियाएं एवं पर्यावरण) (उत्तराखण्ड के अल्मोड़ा जिले की प्रमुख नदी 'गगास पर केस स्टडी') (पर्यावरण पर आधारित) 294
—बीना जोशी