



Medical Bulletin

News You Can Use

Sunlight Offers Surprise Benefit - It Energizes Infection Fighting T cells

Scientific Reports (Nature Publishing Group), December, 2016.

Sunlight allows us to make vitamin D, credited with healthier living, but a surprise research finding could reveal another powerful benefit of getting some sun. Georgetown University Medical Center (USA) researchers have found that sunlight, through a mechanism separate from vitamin D production, energizes the T cells which play a central role in immunity. Their findings, published in *Scientific Reports*, suggest how the skin, the body's largest organ, stays alert to the many microbes that can nest there.

They specifically found that low



levels of blue light, found in sun rays, makes T cells move faster - marking the first reported human cell responding to sunlight by speeding its pace. While production of vitamin D requires UV light (UV light can promote skin cancer and melanoma), blue light from the sun, as well as from special lamps, is safer. Blue light can reach the dermis, and stimulate T cell movement throughout the body.

Synthesis of hydrogen peroxide within the T cells activates a signaling pathway that increases T cell movement. Hydrogen peroxide is released by white blood cells when they sense an infection, and to "call" T cells and other immune cells to mount an immune response against the invading microorganism. There is more research yet to be undertaken in order to understand the impact of these findings, but the research group suggests that based on blue light-induced T cell activation, patients could potentially be offered blue light therapy to boost their immunity.

Researchers Combat Antimicrobial Resistance Using Smartphones

Scientific Reports (Nature Publishing Group), December, 2016.

Antimicrobial-resistant bacteria are posing a severe threat to global public health. In particular, they are becoming more common for high-mortality diseases such as pneumonia, diarrhea and sepsis. Part of the challenge in combatting the spread of these organisms has been the limited ability

to conduct antimicrobial susceptibility testing in regions that do not have access to labs, testing equipment and trained diagnostic technicians to read such tests. A team of University of California, Los Angeles (UCLA) researchers has developed a simple and inexpensive

(Contd. on pg 4)



Greetings from Blue Cross Laboratories!

Dear Colleagues,

Hope all of you are in the best of health and spirit !

It gives me immense pleasure and satisfaction to present you with the first issue of the Blue Cross Medical Bulletin for the new financial year.

This issue will have you updated on a few recent medical developments, and clinical insights involving novel discoveries/avenues in diverse therapeutic categories. We have also included a brief tutorial.

I am sure you would enjoy reading this edition of the Medical Bulletin as you did in the past. Please do remember to send in your feedback, so that we can incorporate the same in future editions.

Happy Reading!

Cheers!

Best wishes & Warm regards,

Dr. Madhurima Dhar MD (Delhi), MS (NJ, USA).
Dy. GM-Medical Services & Editor-in-Chief

Call:
022 66638043

e-mail:
m.dhar@bluecrosslabs.com

Correspond:
Blue Cross Laboratories Pvt Ltd.
Peninsula Chambers, Ganpatrao Kadam Marg,
Lower Parel, Mumbai 400 013



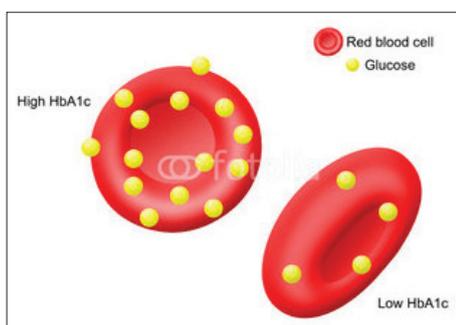
SHORT TUTORIAL

HbA1c

HbA1c also referred as glyco-hemoglobin, glycated hemoglobin or A1c, is a memory test in which the levels of blood glucose over a period of the last 3-4 months are determined. Since RBCs have a life span of 120 days, the HbA1c fractions denote the average glucose levels in blood for the last 90-120 days. A higher HbA1c value indicates poor diabetes control and vice-versa. Monitoring of glucose levels by this test, aids in diabetes monitoring.

There are 3 types of normal hemoglobin – HbA, HbA2 and HbF (fetal hemoglobin), out of these the predominant type is HbA, which is found in larger amounts in adults. A small fraction of HbA becomes chemically modified to HbA1 (glycated Hb) during its lifetime, which is further made up of minor components including HbA1a, HbA1b and HbA1c; again with HbA1c being the most abundant one.

HbA1c is formed when glucose binds to Hb molecules present in the RBCs during a process called glycosylation, i.e., binding of a carbohydrate to a target biomolecule (protein or lipid). Glycosylation is mainly an enzyme-directed process that takes place in a controlled environment. However, the exact process by which HbA1c is formed occurs in the absence of enzymes, and is therefore, termed as non-enzymatic glycosylation or glycation.



The glycated Hb is formed through a two-step non-enzymatic reaction between glucose and Hb molecules. The glucose molecule in its free

aldehyde form attaches to the N-terminal of the beta chain of Hb molecule to form an adduct called aldimine (the Schiff's base). It is the first step in the reaction which is relatively fast and reversible. However, in the second step, this labile intermediate undergoes molecular rearrangement (known as an Amadori rearrangement) to form a stable entity as ketoamine, which is a slow and irreversible process. Once the Hb molecule is glycated, it remains so throughout the life span of the erythrocyte.

The formation of glycated Hb depends on the duration and concentration of glucose to which it is exposed. When the level of glucose increases in the blood, it attaches to Hb in RBCs forming a permanent attachment. As hyperglycemia progresses, the amount of glycosylated Hb also increases. The HbA1c value is directly proportional to the amount of glucose in blood. Monitoring of blood sugar levels by this technique helps to keep control on diabetes. HPLC is considered to be the “Gold standard” technology for HbA1c monitoring.

Clinical significance

- Unlike other diagnostic tests, HbA1c does not require fasting for diabetes detection.
- Consuming sugar-rich diet cannot fluctuate HbA1c levels; can only cause an elevation in the average glucose levels.
- It accurately determines pre-diabetes and diabetes.
- It helps to keep a tab on levels of glucose in diabetic patients.
- It is a test of choice for diagnosis as well as monitoring diabetes.

However, factors such as hemo-



globinopathies, certain anemias, hypertriglyceridemia or conditions which increase RBC turnover may interfere with the measurements or interpretation of HbA1c results.

HbA1c test score	MEAN BLOOD GLUCOSE	
	mg/dL	mmol/L
14.0	380	21.1
13.0	350	19.3
12.0	315	17.4
11.0	280	15.6
10.0	250	13.7
9.0	215	11.9
8.0	180	10.0
7.0	150	8.2
6.0	115	6.3
5.0	80	4.7
4.0	50	2.6

When should it be tested?

- For healthy individuals, at least once in a year.
- In a diabetic person, the test should be done based on the type of diabetes; how well that individual's diabetes is controlled and as recommended by the doctor.
- Among couples planning for pregnancy, HbA1c test is advised to avoid birth defects or trauma to the baby due to diabetic mothers.

Determination of diabetes with HbA1c has become more advantageous than other blood glucose tests, as HbA1c is biologically more stable and remains unaffected by nutritional status or other diseases.

Lifelong Medicines Should Not be A Lifelong Burden

K-GLIM-Trio 1 mg.

Glimepiride 1 mg. + Metformin SR 500 mg. + Voglibose 0.2 mg. Tablets

K-GLIM-Trio 2 mg.

Glimepiride 2 mg. + Metformin SR 500 mg. + Voglibose 0.2 mg. Tablets

Vitamin D Deficiency Increases Risk of Chronic Headache

Scientific Reports (Nature Publishing Group), January, 2017.

Vitamin D deficiency may increase the risk of chronic headache, according to a new study from the University of Eastern Finland.



The Kuopio Ischaemic Heart Disease (KIHD) Risk Factor Study, analyzed the serum vitamin D levels and occurrence of headache in approximately 2,600

men aged between 42 and 60 years in 1984-1989. In 68% of these men, the serum vitamin D level was below 50 nmol/l, which is generally considered the threshold for vitamin D deficiency. Chronic headache occurring at least on a weekly basis was reported by 250 men, and men reporting chronic headache had a lower serum vitamin D levels than others. When the study population was divided into four groups based on their serum vitamin D levels, the group with the lowest levels had over a twofold risk of chronic headache in comparison to the group with the highest levels. Chronic headache was also more frequently reported by men who were examined outside the summer

months of June through September. Because of UVB radiation from the sun, the average serum vitamin D levels are higher during the summer months. The study adds to the accumulating body of evidence linking a low intake of vitamin D to an increased risk of chronic diseases. In Finland and in other countries far from the Equator, UVB radiation from the sun is a sufficient source of vitamin D during the summer months, but outside the summer season, people need to make sure that they get sufficient vitamin D from food or from vitamin D supplements.



Raising 'Good Cholesterol' Not as Effective as Lowering 'Bad Cholesterol'

Journal of the American College of Cardiology, October, 2016.

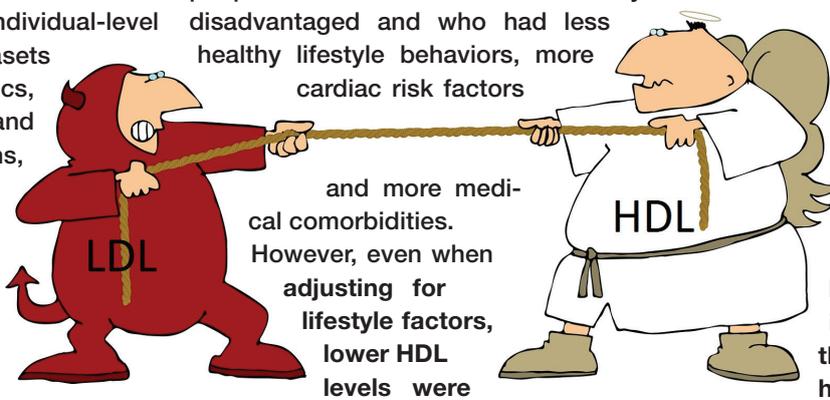
To reduce risk of suffering a cardiac episode, many patients are treated to lower their LDL, or "bad cholesterol," with statins. However, some people don't respond to this treatment, so researchers have been studying HDL and whether raising levels of "good cholesterol" could have the same benefits as lowering "bad cholesterol."

Researchers studied over 631,000 individuals without prior cardiovascular conditions through the CANHEART cohort, a research database that links together multiple individual-level population-based datasets on socio-demographics, cardiac risk factors and comorbidities, medications, etc., in Ontario, Canada. Patients were between 40 and 105 years old, with an average age of 57.2 years, and lived in Ontario for at least two years as of January

1, 2008. This was the first study to evaluate the association between HDL and death in individuals living in the same environment and exposed to the same health care system. The study cohort was divided into groups based on their HDL to allow researchers to examine the relationship between HDL levels and mortality. Researchers compared the HDL levels of people with healthier lifestyles to those with less healthy habits. The lowest levels of HDL were seen in people who were socioeconomically disadvantaged and who had less healthy lifestyle behaviors, more cardiac risk factors

and more medical comorbidities. However, even when adjusting for lifestyle factors, lower HDL levels were still associated with an increased risk of both cardiovascular death and non-cardiovascular related death, such as death from cancer. Individuals with very high HDL levels had an increased risk of non-cardiovascular related death. Researchers said their findings are similar to other studies showing low HDL levels as being associated with a higher risk of cardiovascular death, but this study is among the first to show a similar relationship between HDL and cancer death and other causes of death.

Researchers concluded that this study casts doubt on HDL being used as an independent risk factor for cardiovascular disease, or for raising HDL levels to be used by itself as an intervention to reduce the risk of dying from heart disease.



Lifelong Medicines Should Not be A Lifelong Burden

Liponorm

Atorvastatin 5 mg. Tablets

Liponorm

Atorvastatin 10 mg. Tablets

Liponorm

Atorvastatin 20 mg. Tablets

Liponorm

Atorvastatin 40 mg. Tablets

Researchers Combat Antimicrobial Resistance Using Smartphones (Contd. from page 1)

automated diagnostic test reader for antimicrobial resistance using a smartphone. The technology could lead to routine testing for antimicrobial susceptibility in areas with limited resources.

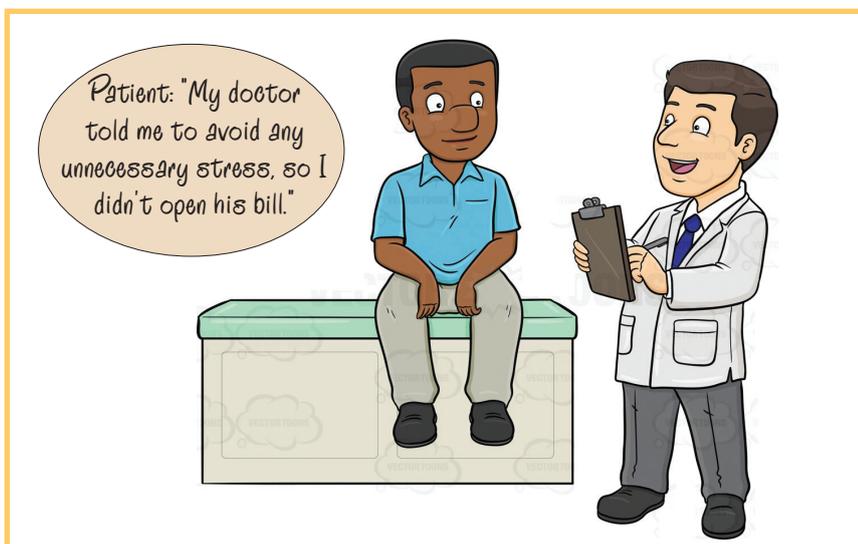
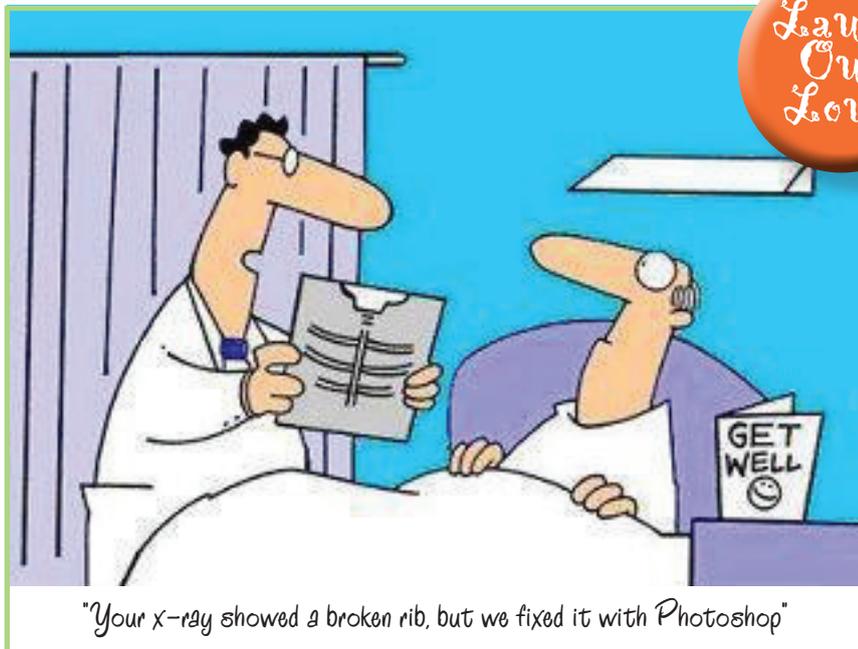
The device connects to a smartphone and has a plate that can hold up to 96 wells for testing. An array of LEDs illuminates the sample and then the phone's camera is used to sense small changes in light transmission of each well containing a different dose selected from a panel of antibiotics. Images are sent to a server to automatically perform antimicrobial susceptibility testing and the results are returned to the smartphone in about

one minute.

The researchers then tested the device in clinical settings at UCLA. They used special plates prepared with 17 different antibiotics targeting *Klebsiella pneumoniae*, a bacteria containing highly resistant antimicrobial profiles. During the clinical tests, they used 78 samples from patients. Their results showed that the mobile-phone-based reader meets the FDA-defined criteria for laboratory testing, with a detection accuracy of 98.2 percent. The lowest concentration of antibiotic is used to track drug resistance. A criterion of susceptibility or resistance to antibiotics is assigned to each

bacteria/drug combination in order to guide the physician in treatment decisions.

This mobile reader could eliminate the need for trained diagnosticians to perform antimicrobial susceptibility testing, reduce the cost barrier for routine testing, and assist in tracking of bacterial resistance globally. An additional advantage of this technology is the possibility of examining bacterial growth in the presence of a drug at an earlier time point than is currently read (about 24 hours). This could allow for a more rapid turnaround time of the results to the physician, which might help save more lives.



Chest Pain: New Tool Helps Doctors Decide When Tests Needed

JAMA Cardiology, Published online February, 2017.

A two year follow-up on a study involving more than 10,000 people with stable chest pain finds that an online tool can accurately predict which patients are likely to have normal non-invasive tests and remain free of cardiac events. The variables used to predict minimal risk in the tool are: younger age; female; racial or ethnic minority; no history of hypertension, diabetes, dyslipidemia or family history of premature coronary artery disease; never smoking; symptoms unrelated to physical exertion or stress; and higher high-density lipoprotein (HDL) cholesterol.



The tool can be found at: <http://www.promiserisktools.com>

This tool is a good first step in helping clinicians quantify minimal risk when presented with a patient with stable chest pain, and opens up a conversation between doctor and patient on whether a test may be worthwhile.

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