The Lord is like a strong tower, where the righteous can go and be safe.
Proverbs 18:10

ISSN 2451-8213

DIYARYO KABITENYO

Nagmamalasakit sa lalawigan

Entered as FIRST CLASS MAIL at Imus Post Office with Business Mail Permit No. IC-19-06-249

Vol. 23 No. 7 | April 6-12, 2020 | P 10.00

Be alert, stand firm in the faith, be brave, be strong.
1 Corinthians 16:13

Zero crime recorded in Cavite

The Cavite Police Provincial Office recorded last April 2 a "zero-crime" incident in the entire province where a strict enforcement of the Enhanced Community Quarantine to prevent the spread of the deadly COVID-19 virus since last March 16 had already resulted in the apprehension of more than 2,500 violators, a report to Police Regional Office 4-A director, Brigadier General Vicente D. Danao Jr. said last April 2.

Having already recorded a 66 percent crime reduction in the province from March 17 to date owing to the strict enforcement of the quarantine directive and city and municipal ordinances,

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Caviteños UK Association holds medical and dental mission for Alfonso residents

Caviteños UK Association in cooperation with the Provincial Government of Cavite and the local government of Alfonso conducted a medical and dental mission for the benefit of Alfonso residents held at Camp Benjamin, Barangay Taywanak Ilaya, Alfonso, Cavite recently. The mission was an overwhelming success serving a total of 1,575 individuals who availed the free services which include x-ray and ECG, adult general check-up, pediatric/children check-up, maternal/pregnant women check-up, random blood sugar testing, skin care kits, nutrition, family planning counseling, dental extraction, oral prophylaxis, dental care kits and reading eyeglasses. Doctors and dentists from General Emilio Aguinaldo Memorial Hospital, Philippine Army and Alfonso Rural Health Unit performed medical check-up to 724 patients and dental check-up/extraction to 134 locals. Volunteers from the Provincial Health Office, OPG-Extension Office and other departments assisted in rendering other services together with the Barangay Health Workers and Barangay Nutrition Scholars. Mayor Randy Salamat, 8th District Board Member Vic Varias and the local barangay officials were all grateful for the mission for their constituents.

DIYARYO KABITENYO

ISSN [illegible]

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DIYARYO KABITENYO is published weekly and circulated throughout the province of Cavite. It has its editorial and business offices at Block 13 Lot 5 [illegible] Homes Subdivision, Anabu I-C, City of Imus, Cavite. It is registered at the Department of Trade and Industry Region 4 [illegible]. Our cellphone number is [illegible].

Subscription Rate:
1 month - P 40.00
3 months - 120.00
6 months - 240.00

Advertising Rate:
Commercial P300.00/col cm.
Legal 180.00/col cm.

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New CT scoring criteria for timely diagnosis, treatment of coronavirus disease

Updated CT scoring criteria that considers lobe involvement, as well as changes in CT findings, could quantitatively and accurately evaluate the progression of coronavirus disease (COVID-19) pneumonia, according to an open-access article in the American Journal of Roentgenology (AJR).

"The earlier that COVID-19 is diagnosed and treated, the shorter the time to disease resolution and the lower the highest and last CT scores are," concluded lead author Guoquan Huang of Wuhu Second People's Hospital in China.

Assigning CT scores to 25 patients according to CT findings and lung involvement, Huang and colleagues recorded the time from symptom onset to diagnosis and treatment for each patient. Patients with COVID-19 were divided into two groups (patients for whom this interval was ≤ 3 days) and group 2 (those for whom the interval was > 3 days).

Using a Lorentzian line-shape curve to show the variation tendency during treatment, the fitted tendency curves for group 1 and group 2 were significantly different. Peak points showed that the estimated highest CT score was 10 and 16 for each group, respectively, and the time to disease resolution was 6 and 13 days, respectively.

The Mann-Whitney test showed that the last CT scores were lower for group 1 than for group 2 (p = 0.025), although the chi-square test found no difference in age and sex between the groups. The time from symptom onset to diagnosis and treatment had a positive correlation with the time to disease resolution (r = 0.93; p = 0.000), as well as with the highest CT score (r = 0.83; p = 0.006).

(ZERO... from page 1)

Cavite police director, Colonel Marlon R. Santos said they expect to record lesser crimes in the days to come with the local police on full alert and continuing their mobile and foot patrols while manning Quarantine Control Points to prevent the movement of unauthorized persons.

Last April 2, Santos said they recorded zero-crime incident in the province, the very 1st time since last March 16 even as they accounted for 791 more quarantine violators and arrested 20 law offenders specifically those involved in illegal drug trafficking and abuse.

The official said the quarantine offenders are now facing charges either for violation of Executive Order 10 Series 2020 or An Order Placing The Province Of Cavite Under Community Quarantine In View of COVID-19 Outbreak, curfew hours, drinking in public and non-cooperation with agents of a person in authority.

Santos said that over the past 48-hours, they conducted four anti-narcotics operations which led to the arrest of 15 known drug personalities and the seizure of some P40,000 worth of shabu in Bacoor, Dasmariñas, General Trias and Cavite cities as well as Tanza municipality.

The Cavite police director said they also arrested five more wanted persons in the province during the period including the no. 3 most wanted robber in Dasmariñas City and the 5th most wanted man in Imus City who is facing charges for violation of the anti-carnapping law.

Santos appealed anew to Cavite residents to stay in their respective homes and avoid loitering in public without any business as they will be apprehended by the local police as part of their effort to help prevent the further spread of the deadly virus.

Understanding how the protein tau moves between neurons yields insight into possible treatments for neurodegenerative diseases

In the fight against neurodegenerative diseases such as frontotemporal dementia, Alzheimer's and Chronic Traumatic Encephalopathy, the tau protein is a major culprit. Found abundantly in our brain cells, tau is normally a team player — it maintains structure and stability within neurons, and it helps with transport of nutrients from one part of the cell to another.

All that changes when tau misfolds. It becomes sticky and insoluble, aggregating and forming neurofibrillary tangles within neurons, disrupting their function and ultimately killing them. Worse, it probably can take relatively few misfolded tau proteins from one cell to turn its neighbors into malfunctioning, dying brain cells.

"This abnormal form of tau starts to spread from cell to cell," said UC Santa Barbara neuroscientist Kenneth S. Kosik. "It's reminiscent of a serious problem that's known in biology, called prion diseases, such as mad cow disease."

Importantly, unlike true prion diseases, which are spread by contact with infected tissue or bodily fluid, prion-like diseases such as frontotemporal dementia and other tauopathies aren't contagious – they can't be spread from person to person or by coming into contact with infected tissue. However, the replication is eerily familiar. A misfolded tau protein gets out of a cell and gets taken up by a normal neighboring cell. It then acts as a template in that cell, Kosik explained, which subsequently produces misfolded tau. Over and over again, the cells produce and secrete the toxic knockoff version of tau until whole regions of the brain are affected, which over time will rob a person of their cognitive and physical functions.

What if the spread could be contained? If caught early enough, controlling the proliferation of pathological tau could keep the neurodegenerative disease from progressing, and give the patient a shot at a normal life. But in order to do that, scientists first have to understand how the protein gets around.

In a paper published in the journal Nature, Kosik and his team have uncovered one such mechanism by which tau travels from neuron to neuron. Not only does it shed light on the extensively studied but rather poorly understood tau propagation in neurodegenerative disease, it hints at a way to control the spread of pathological tau.

"The discovery of a mechanism by which tau transits from cell to cell provides a clue that will open up a deep structural approach to the design molecules that can prevent tau spread," said Kosik, who is the Harriman Professor of Neuroscience Research in UC Santa Barbara's Department of Molecular, Cellular, and Developmental Biology.

The major player in this mechanism of uptake and spread, it turns out, is the low-density lipoprotein called LRP1 (low density lipoprotein receptor-related protein 1). It's located on the brain cell membrane and is involved in several biological processes, among them helping the neuron take in cholesterol, which is used as part of cellular structure.

LRP1, the researchers discovered, takes up tau in neighboring cells after it escapes from a cell into the extracellular space. One of several low density lipoprotein receptors, LRP1 was singled out by process of elimination.

By systematically inhibiting the expression of each of the members of this family via CRISPRi technology, and exposing them to tau, the researchers determined that genetic silencing of LRP1 effectively inhibited tau uptake.

"This protein is an interesting one in its own right because it's a little bit like an extracellular trash can," Kosik said.

Global nuclear medicine community shares COVID-19 strategies and experiences

In an effort to provide safer working environments for nuclear medicine professionals and their patients, clinics across five continents have shared their approaches to containing the spread of COVID-19 in a series of editorials, published ahead of print in The Journal of Nuclear Medicine. This compilation of strategies, experiences and precautions is intended to support nuclear medicine clinics as they make decisions regarding patient care.

Clinicians from Africa, Asia, Australia, Europe and North America provided summaries of the steps their individual hospitals and clinics have taken to combat the COVID-19 pandemic. According to editorial author, Ken Herrmann, MD, MBA, chair of nuclear medicine at the University of Duisburg-Essen, Essen, Germany, the most common steps taken by clinics have been to triage patients upon arrival, reduce elective nuclear medicine studies, improve hygienic practices and establish rotations of medical personnel to create back-up teams should a staff member become infected.

For patients undergoing essential nuclear medicine procedures, incidental findings can suggest signs of COVID-19, according to editorial author Domenico Albano, MD, nuclear medicine physician at the University of Brescia and Spedali Civili Brescia in Italy. Reporting on local experience in a region with high COVID-19 prevalence, Albano and colleagues found six out of 65 asymptomatic PET/CT patients and one of 12 radioiodine patients showed signs of interstitial pneumonia. Five of the seven patients were confirmed to have COVID-19; the remaining two did not receive immediate testing but underwent quarantine and careful monitoring.

"Our observations show that it is mandatory for healthcare personnel to employ hygienic measures, minimize patient contact and optimize distance, and use protective equipment for general clinical services in regions with high COVID prevalence," said Albano. "It is also important to consider potential COVID-19 related findings during reading, and to report such findings to the patient and his referring physicians immediately, for appropriate action."

Of particular interest to the nuclear medicine community is the safety of performing ventilation/perfusion studies. "Previous literature has documented a small degree of leakage of the aerosol from the closed delivery system into the room with the potential for expired air and aerosolized secretions to contaminate personnel within the imaging suite," noted Lionel S. Zuckier, MD, MBA, FRCPC, editorial author and chief of the division of nuclear medicine at Montefiore Medical Center and Albert Einstein College of Medicine in Bronx, New York. "In addition, patients frequently cough following inhalation of the radiopharmaceutical, which may further expose nuclear medicine workers to aerosolized secretions."

Given these circumstances, ventilation/perfusion studies have the potential to result in aerosolized secretions that can contribute to the spread of COVID-19. Zuckier and colleagues recommend eliminating the ventilation portion from lung perfusion/ventilation scans to reduce the risk of spreading COVID-19.

Additional steps taken by clinics to combat the spread of COVID-19 include limiting or cancelling research studies and scheduling symptomatic patients needing essential studies for the end of the day (allowing for thorough cleaning after the study). Some clinics have conducted refresher courses in infection control management and basic emergency management, while others have stressed the need for kindness and consideration at this unprecedented time.

Concerns were also voiced by nuclear medicine clinics around the world regarding potential nuclear reactor production restrictions and international travel limitations. Strategies to tackle these issues are being addressed by nuclear medicine and molecular imaging society leadership worldwide.

Understanding brain tumors in children

Medulloblastomas are among the most common malignant brain tumours affecting children. They spread from the cerebellum to the surrounding tissue and can also spread to other parts of the central nervous system via the cerebrospinal fluid. Because these tumoors grow rapidly, physicians do not have much time to find a suitable treatment.

Researchers from EMBL, together with colleagues from Hopp Children's Cancer Center Heidelberg (KiTZ), the German Cancer Consortium, and St. Jude Children's Research Hospital have conducted the most comprehensive medulloblastoma-related genetic investigation to date. "We analysed the genome and transcriptome of 800 children, adolescents, and adults with medulloblastoma and compared the genetic data with data from healthy individuals," explains lead author Dr. Sebastian Waszak from EMBL, who was also part of the PMBL-led Pan Cancer project.

In characterising the molecular properties of medulloblastoma, the scientists hope to be able to recommend other treatment options besides standard therapies, and to develop new therapies with a focus on the mode of action. In analysing the healthy and mutated genome, they came across a particularly striking hereditary difference in children and young people with brain tumours in the so-called Sonic Hedgehog medulloblastoma subgroup.

A hereditary genetic defect in 15 percent of cases meant that tumours were no longer able to produce the elongator complex protein 1 (ELP1).

Advances in production of retinal cells for treating blindness

Researchers at Karolinska Institutet and St Erik Eye Hospital in Sweden have discovered a way to refine the production of retinal cells from embryonic stem cells for treating blindness in the elderly. Using the CRISPR/Cas9 gene editing, they have also managed to modify the cells so that they can hide from the immune system to prevent rejection. The studies are published in the scientific journals Nature Communications and Stem Cell Reports.

Age-related macular degeneration of the eye is the most common cause of blindness in the elderly. This loss of vision is caused by the death of the photoreceptors (the rods and cones) resulting from the degeneration and death of the underlying retinal pigment epithelial (RPE cells), which provide the rods and cones vital nourishment. A possible future treatment could be to transplant fresh RPE cells formed from embryonic stem cells.

Working with colleagues at St Erik Eye Hospital, researchers at Karolinska Institutet have now found specific markers on the surface of the RPE cells that can be used to isolate and purify these retinal cells. The results are published in Nature Communications.

"The finding has enabled us to develop a robust protocol that ensures that the differentiation of embryonic stem cells into RPE cells is effective and that there is no contamination of other cell types," says principal investigator Fredrik Lanner, researcher at the Department of Clinical Science, Intervention and Technology and the Ming Wai Lau Center for Reparative Medicine at Karolinska Institutet. "We've now begun the production of RPE cells in accordance with our new protocol for the first clinical study, which is planned for the coming years."

One obstacle when transplanting tissue generated from stem cells is the risk of rejection, which occurs if transplantation antigens of the donor and patient tissue differ. Research groups around the world are therefore working on creating what are known as universal cells, which ideally will not trigger an immune response.

In a study published in Stem Cell Reports the same group at Karolinska Institutet created embryonic stem cells able to hide from the immune system. Using CRISPR/Cas9 gene editing, they removed certain molecules, HLA class I and class II, which sit on the surface of the stem cells as a means by which the immune system can identify them as endogenous or not.

How dopamine drives brain activity

Using a specialized magnetic resonance imaging (MRI) sensor, MIT neuroscientists have discovered how dopamine released deep within the brain influences both nearby and distant brain regions.

Dopamine plays many roles in the brain, most notably related to movement, motivation, and reinforcement of behavior. However, until now it has been difficult to study precisely how a flood of dopamine affects neural activity throughout the brain. Using their new technique, the MIT team found that dopamine appears to exert significant effects in two regions of the brain's cortex, including the motor cortex.

"There has been a lot of work on the immediate cellular consequences of dopamine release, but here what we're looking at are the consequences of what dopamine is doing on a more brain-wide level," says Alan Jasanoff, an MIT professor of biological engineering, brain and cognitive sciences, and nuclear science and engineering. Jasanoff is also an associate member of MIT's McGovern Institute for Brain Research and the senior author of the study.

The MIT team found that in addition to the motor cortex, the remote brain area most affected by dopamine is the insular cortex. This region is critical for many cognitive functions related to perception of the body's internal states, including physical and emotional states.

MIT postdoc Yun Li is the lead author of the study, which appears today in Nature.

Like other neurotransmitters, dopamine helps neurons to communicate with each other over short distances. Dopamine holds particular interest for neuroscientists because of its role in motivation, addiction, and several neurodegenerative disorders, including Parkinson's disease. Most of the brain's dopamine is produced in the midbrain by neurons that connect to the striatum, where the dopamine is released.

For many years, Jasanoff's lab has been developing tools to study how molecular phenomena such as neurotransmitter release affect brain-wide functions. At the molecular scale, existing techniques can reveal how dopamine affects individual cells, and at the scale of the entire brain, functional magnetic resonance imaging (fMRI) can reveal how active a particular brain region is. However, it has been difficult for neuroscientists to determine how single-cell activity and brain-wide function are linked.

"There have been very few brain-wide studies of dopaminergic function or really any neurochemical function, in large part because the tools aren't there," Jasanoff says. "We're trying to fill in the gaps."

About 10 years ago, his lab developed MRI sensors that consist of magnetic proteins that can bind to dopamine. When this binding occurs, the sensors' magnetic interactions with surrounding tissue weaken, dimming the tissue's MRI signal. This allows researchers to continuously monitor dopamine levels in a specific part of the brain.

In their new study, Li and Jasanoff set out to analyze how dopamine released in the striatum of rats influences neural function both locally and in other brain regions. First, they injected their dopamine sensors into the striatum, which is located deep within the brain and plays an important role in controlling movement. Then they electrically stimulated a part of the brain called the lateral hypothalamus, which is a common experimental technique for rewarding behavior and inducing the brain to produce dopamine.

Then, the researchers used their dopamine sensor to measure dopamine levels throughout the striatum. They also performed traditional fMRI to measure neural activity in each part of the striatum. To their surprise, they found that high dopamine concentrations did not make neurons more active. However, higher dopamine levels did make the neurons remain active for a longer period of time.

"When dopamine was released, there was a longer duration of activity, suggesting a longer response to the reward," Jasanoff says. "That may have something to do with how dopamine promotes learning, which is one of its key functions."

Engineers 3D print soft, rubbery brain

The brain is one of our most vulnerable organs, as soft as the softest tofu. Brain implants, on the other hand, are typically made from metal and other rigid materials that over time can cause inflammation and the buildup of scar tissue.

MIT engineers are working on developing soft, flexible neural implants that can gently conform to the brain's contours and monitor activity over longer periods, without aggravating surrounding tissue. Such flexible electronics could be softer alternatives to existing metal-based electrodes designed to monitor brain activity, and may also be useful in brain implants that stimulate neural regions to ease symptoms of epilepsy, Parkinson's disease, and severe depression.

Led by Xuanhe Zhao, a professor of mechanical engineering and of civil and environmental engineering, the research team has now developed a way to 3D print neural probes and other electronic devices that are as soft and flexible as rubber.

The devices are made from a type of polymer, or soft plastic, that is electrically conductive. The team transformed this normally liquid-like conducting polymer solution into a substance more like viscous toothpaste – which they could then feed through a conventional 3D printer to make stable, electrically conductive patterns.

The team printed several soft electronic devices, including a small, rubbery electrode, which they implanted in the brain of a mouse. As the mouse moved freely in a controlled environment, the neural probe was able to pick up on the activity from a single neuron. Measuring this activity can give scientists a higher-resolution picture of the brain's activity.

Changes in surface sugarlike molecules help cancer metastasize

Changes in a specific type of sugarlike molecule, or glycan, on the surface of cancer cells help them to spread into other tissues, according to researchers at the University of California, Davis. Published March 23 in Proceedings of the National Academy of Sciences, the work could lead to diagnostic tests and new therapies to slow or stop the spread of cancers.

The research team led by Professor Carlito Lebrilla, UC Davis Department of Chemistry, worked with cells derived from a human cholangiocarcinoma, or bile duct cancer. Cholangiocarcinoma is relatively rare but becoming more common in the U.S. It metastasizes readily and is often incurable by the time of diagnosis.

Generally, researchers have studied how cancer cells spread by looking at the proteins on their surface membranes. Some of these proteins may serve as receptors that engage with other cells, allowing cancerous cells to attach and move into tissues.

But proteins on living cells are also coated with a wide variety of sugarlike carbohydrate molecules called glycans. These glycans modify how proteins – and therefore the cells – interact with their environment. While DNA dictates the protein's structure, glycans and carbohydrates are made and metabolized by the protein's own machinery. That makes studying these molecules even more challenging.

Lebrilla's laboratory at UC Davis has been studying glycans, glycoproteins and the roles they play in the body for many years, developing new techniques to analyze and characterize them.

Metastatic cholangiocarcinoma cells had high levels of the glycan mannose on surface proteins, Lebrilla's team discovered. These cancer cells lacked the gene for an enzyme that breaks down mannose. The presence of mannose was associated with cancer cells being able to spread out on a dish and migrate through pores in a membrane, simulating squeezing through the wall of a blood vessel into surrounding tissue.

"What is interesting here is that it's a new way to look at cancer metastasis. Instead of looking at proteins, we've looked at how protein modifications are affecting the metastatic behavior of cancer cells," Lebrilla said.

If modified glycans are a characteristic of metastatic cancers, that could present a new way to diagnose cancer and perhaps predict which cancers are likely to become invasive. The glycans and the metabolic pathways that make them could also be targets for new drugs.

DIYARYO
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Nagmamalasakit sa lalawigan

Vol. 23 No. 7 | April 6-12, 2020 | P 10.00

Blocking the iron transport could stop tuberculosis

The bacteria that cause tuberculosis need iron to survive. Researchers have now solved the first detailed structure of the transport protein responsible for the iron supply. When the iron transport into the bacteria is inhibited, the pathogen can no longer grow. This opens novel ways to develop targeted tuberculosis drugs.

One of the most devastating pathogens that lives inside human cells is Mycobacterium tuberculosis, the bacillus that causes tuberculosis. According to the World Health Organization, 1.5 million people died in 2019 from this disease that generally affects the lungs. The rise of multidrug resistant M. tuberculosis strains, which are resistant to many of the most effective anti-tuberculosis drugs, is particularly worrying. In other words, novel drugs to treat tuberculosis are urgently needed.

All living organisms, including pathogens, need iron to survive. When a human cell is infected by pathogens like M. tuberculosis, it reduces the iron concentration in a membrane and thereby tries to starve the invader. The tuberculosis bacteria, in turn, start to release small molecules called mycobactins. These can bind free iron extremely well and thus steal it from the host cell. The iron captured by mycobactin is then transported into the bacteria by a protein named IrtAB.

A team of researchers led by Markus Seeger, professor at the Institute of Medical Microbiology of the University of Zurich (UZH), has now analyzed in detail the protein responsible for transporting iron from the infected host cell into the bacteria.

Modeling the human eye in a dish

Despite its small size relative to the rest of the body, the eye is one of the most complex organs of the human body and has been difficult to study in a lab. Now, researchers from Osaka University have developed a novel method to model eye development and disease using human induced pluripotent stem cells (hiPSCs). In a new study published in Journal of Biological Chemistry, they showed how tracking the expression of PITX2, a key protein during eye development, in developing hiPSCs enables the isolation of a certain group of cells that play important roles in eye development, biology and disease.

Ever since their discovery over a decade ago, hiPSCs have continued to be used to replicate human biology and disease in a lab without the need for animals. Their streamlined use is accompanied by the possibility of easily genetically altering the cells to study the function of proteins. Although to date several cellular models of multiple organs have been developed using hiPSC, due to its complex and heterogeneous nature, the eye has been more difficult to recreate using these cells.

"Unlike other organs, the eye is more difficult to recreate in the lab due to the presence of heterogeneous cells in the eye," says corresponding author of the study, Ryohei Hayashi.