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Science INSIGHTS®

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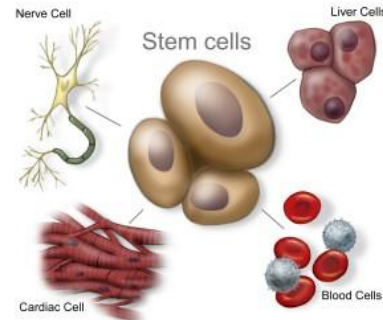
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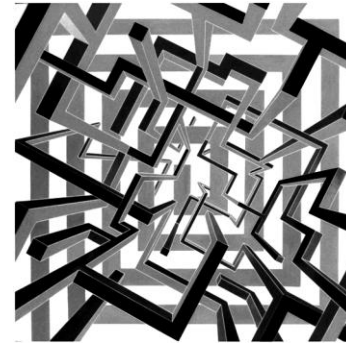
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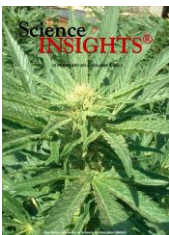
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COVER

The legalization of recreational marijuana makes this ever illegal drug a hot topic recently. Colorado's action right now looks all going smoothly. It marked the first time that the drug could be sold commercially for nonmedical purpose. However the biggest concern of critics is whether the new policy will increase teen use or lead to marijuana trickling out of the state. The only thing we can do today is let time tell us the answer. See page 123.

Image: BASE illustrating group



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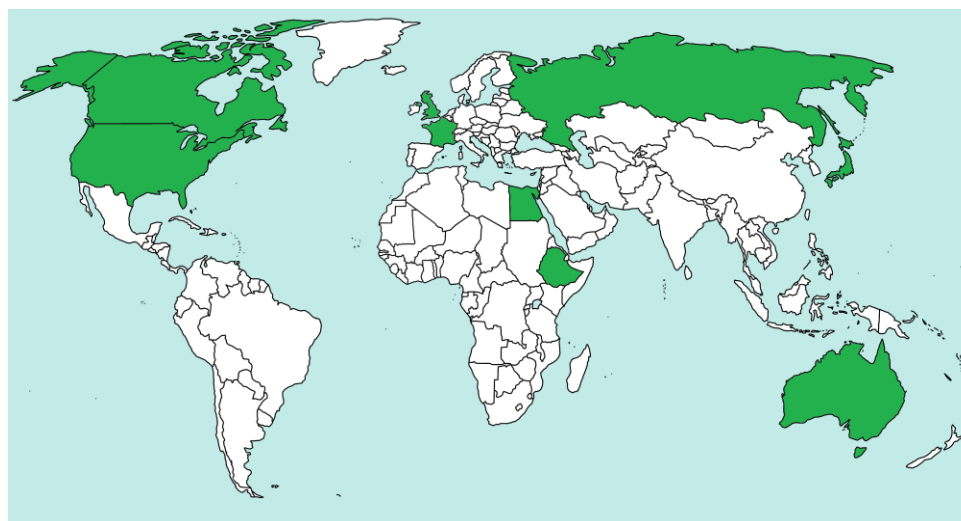
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Washington DC, USA

Black Box of U.S. Health Care Prices

Have you ever thought about the expensive medical expenses when you “purchase” your health care plan? What if you could compare hospital and doctor’s fees the way you could shop for something else online? Will the estimated millions Americans who signed up for insurance through the Affordable Care Act be more demanding consumers? Who can answer these questions accurately? Given the notorious black box nature of U.S. health care – most patients have no idea what a service costs – such an idea seems unlikely and new tools to pry open medical pricing vaults may seem like a pipe dream of some tech-savvy entrepreneur. Hospital pricing is available through the Centers for Medicare and Medicaid Services, but it only tells you what institutions are charging the government for Medicare and Medicaid patients. That’s not particularly helpful if you are privately insured, covered by a company plan or a policy offered through the new state and federal policies. In an ideal world, medical service pricing would resemble what Amazon.com does with outside vendors. They are all rated and compete mightily on cost and service. None of them want a lower star rating or bad consumer reviews, so they bend over backwards to see that you’re treated well. A market-driven system driven by technology would increase transparency and reduce costs. The average cost for a day in a U.S. hospital is \$4,287; in France, it is \$853. The total price for a normal birth is nearly \$10,000 in the U.S.; in the United Kingdom, it is \$2,641. How about a knee replacement? It is over \$25,000 in America – more than twice the cost in Switzerland. U.S. physicians receive substantially more for office visits. Under direct pressure from insurers and indirectly from the introduction of the Affordable Care Act – add-



ing millions of new health insurance customers through private policies – pricing has been under the gun. Those who are seeking quality health care at a reasonable price would do what they’ve always done: They shop around. But they can’t do that without a means of comparison. ■

London, UK

Cancer Diagnoses Hit New High in Britain

In this highly-developed world of medical science, could we human beings save us from different diseases? A new figure showed that the number of people diagnosed with cancer annually in Britain has reached a new high of almost a third of a million. More than 330,000 people were diagnosed with some form of the disease in 2011, the charity Cancer Research UK said – an increase of almost 50,000 over the last decade. Researchers say an ageing population is one factor behind the rise as people are living longer and therefore more likely to contract the disease. The rate of diagnosis has climbed by 35 percent between 1975



and 2011, also fuelled by increasing alcohol consumption and weight gain. The figures show that 331,487 people were diagnosed with cancer in Britain in 2011, rising from 329,547 in 2010. The number of people surviving the disease, however, has doubled in the last 40 years thanks to improvements in prevention, diagnosis and treatment. In 1990, 220 in every 100,000 people died of cancer but this fell by 22 per cent to 170 per 100,000 in 2011. So research is research, it is really difficult to say what made the number increase. ■

Cairo, EGYPT

Archaeologists Uncover New Pharaoh in Egypt

History is interesting for us, and it is undoubtedly our life would be also interesting for our descendents. Archaeologists in Egypt believe they have discovered the remains of a previously unknown pharaoh who reigned more than 3,600 years ago. The skeleton of King Senebkay was uncovered at South Abydos in Sohag province, about 300 miles south of Cairo, by a University of Pennsylvania expedition working with the government, the Egyptian antiquities ministry said. Never before heard of in ancient Egyptian history, King Senebkay’s name was found inscribed in hieroglyphics written inside a royal car-

touché - an oval with a horizontal line at one end signaling a royal name, the ministry said in a statement. Photographs released with the statement showed what appeared to be a heavily damaged sarcophagus in a burial chamber with no roof. Its stone walls were decorated with painted images. The statement dates King Senebkay's rule to 1650 BC during a time known as the second intermediate period when central authority collapsed and small kingdoms sprung up between the end of the Middle Kingdom and the start of the New Kingdom. ■

Addis Ababa, ETHIOPIA

China Slams “Troublemaker” Japan

From the historical view, China and Japan have a complex bond. From World War II to Diaoyu Islands, these two countries slam each other. Recently, China launched a scathing diplomatic attack against Japan, warning African nations of an impending “resurrection of Japanese militarism” and branding Prime Minister Shinzo Abe a “troublemaker”. In a press conference held the day after Abe wrapped up a landmark African tour aimed at boosting Japan's presence in the continent, China's ambassador to the African Union accused him of trying to undermine Beijing's own diplomatic reach. As the China's ambassador to Ethiopia Xiaoyan Xie told reporters

that Abe had become the biggest troublemaker in Asia, and he had worked hard to portray China as a threat, aiming to sow discord, raising regional tensions and so creating a convenient excuse for the resurrection of Japanese militarism. Xie said that the world will have to be on the alert that the current Japan's prime minister is leading the country onto a very dangerous road, and the international community should do everything to prevent Japan from going down even further along the road. Xie also repeated criticism over Abe's visit to the Yasukuni war shrine, believed to be the repository of around 2.5 million of Japan's war dead, including several high-level officials executed for war crimes after World War II. For the strange relationship between China and Japan, these two are all too sensitive. Japan does not dare face her notorious history, and China in contrast pressure on this making Japan lose her breath. ■

Tokyo, JAPAN

How to Clear Up Space Junk?

Have you imaged how much the space junk there? Japanese space scientists are set to trial a tether they hope will help pull junk out of orbit around Earth, clearing up tonnes of planetary clutter. Researchers at The Japan Aerospace Exploration Agency (JAXA) have developed what they called an

electrodynamic tether made from thin wires of stainless steel and aluminum. The idea is that one end of the strip will be attached to one of the thousands of dead satellites or bits of rocket that are jamming up space and endangering working equipment. The electricity generated by the tether as it swings through the Earth's magnetic field is expected to have a slowing effect on the space junk, which should, scientists say, pull it into a lower and lower orbit. Eventually the detritus will enter the Earth's atmosphere, burning up harmlessly long before it has chance to crash to the planet's surface. The actual reeling in of orbiting rubbish will be the objective of future experiments, he said. A spokesman for JAXA said the agency also plans to conduct its own trial on a tether in 2015. More than 20,000 bits of cast off equipment, including old satellites, pieces of rocket and other fragments are uselessly orbiting the Earth in a band of 800-1,400 kilometers from the surface of the planet at terrific speed. Their presence causes problems for space scientists who have to try to prevent them colliding with functioning kit because of the huge damage they can cause. ■

Moscow, RUSSIA

Install Earth-Watching Cameras on Space Station

We are exploring the outer space every day, and spying our earth every minute. Two Russian cosmonauts will venture outside the International Space Station January, 2014 in a second bid to install two high-definition cameras on the exterior of the orbiting lab. Officials with UrtheCast (pronounced “Earth cast”), the Vancouver-based company, said the space flyers will try again on Jan. 27 to install the company's Earth-watching cameras after a technical glitch marred an initial attempt last month. During a long spacewalk on Dec. 27, 2013, Russian cosmonauts Oleg Kotov and Sergey





Ryazanskiy successfully installed UrtheCast's two cameras outside the space station. But before the cosmonauts went back inside the orbiting lab, they had to remove and return the cameras to storage because mission controllers in Moscow were unable to confirm the devices were receiving power from the space station due to a cabling problem. UrtheCast's cameras are designed to beam detailed views of Earth from space in near real time to the company's partners and customers on the ground who might be monitoring the environment, natural disasters, agricultural land and other features and events on the planet. The cameras arrived at the space station in November as part of the unmanned Russian Progress 53 cargo delivery. ■

Haverford, USA

How Falcons Stalk Their Prey in Flight?

Have you seen a falcon swoops through the air and spots a flock of birds in site view or on television? These crafty predators use a special aerial attack strategy to capture prey in midflight, according to a new study by researcher from Haverford College in Haverford, Pennsylvania, USA. To gain insight into the hunting practices of falcons, researchers outfitted falcons with miniature helmet- and back-

pack-mounted video cameras to record footage of raptor attacks in action. The resulting video footage revealed that falcons stalk their prey by maneuvering through the air in such a way that the target appears stationary in their field of view. This lethal attack strategy can help falcons effectively intercept their prey without having to tail closely behind their victims. The researchers initially set out to examine the opposite effect: How animals react to the aerial onslaughts of falcons and other airborne predators. Yet, they found there had been little progress in understanding falcon hunting strategies and attack behaviors. If the victim consistently appeared at the center of the falcon's field of view, the predator was likely following the prey, shadowing its every move. While this is the simplest way for one animal to track another, the researchers discovered that falcons use more complex tactics to hunt. Instead, falcons tend to train their eyes on their victims by constantly readjusting their flying position so that the prey appears motionless against the background. This helps them to effectively predict the future position of their prey, which enables the large birds to head off and intercept their victims in the least amount of time. Previous research on dragonflies and bats found similar uses of this type of attack strategy. ■

Clayton South, AUSTRALIA

Put Sensors on Bees to Save Them from Extinction

We all like the bee, but have ever thought they are now on the edge of extinction? The global bee population has suffered a lot over the past few years. About 31% of the commercial US bee colonies died or disappeared in 2012, and this will have dramatic impacts on our food supply. Now, a group of Australian scientists are trying a new approach to stop them from becoming extinct. Their plan is to strap minuscule sensors to 5,000 honey bees and monitor where they fly. The plan is the first of its kind to track bees as they move in real time. Worker bees generally follow patterns each day, and a change in those patterns could indicate an environmental disturbance that could threaten the whole colony. The scientists at Australia's Commonwealth Scientific and Industrial Research Organization want to put tiny sensors on the insects' backs so they can follow the bees where they fly. The sensors use radio frequency identification chips that work similarly to a vehicle's e-tag, recording when an insect passes a certain point. This information is sent back to the scientists' base where they can use all 5,000 recordings to comprehensively visualize and track how the bees move together through an area. If a change in the bees' flying patterns is detected, scientists can immediately respond and investigate the surrounding environment for pesticides or other threats. It is fairly easy for scientists to put sensors on bees – they first put the bees in the refrigerator for a few hours, which puts them in a coma-like state long enough for scientists to attach the tracking devices to their backs via an adhesive. Once the sensor is attached, the bees will wake up and return to the hive normally. Tracking bees in real-time could lead scientists to pesticide-infected areas. This is the newest

strategy scientists have come up with to battle the growing bee shortage. Recently, a group from Washington State University collected sperm samples from honey bees so they could cryogenically freeze it and eventually create a sort of “super bee” that could withstand the factors thought to be behind colony collapse disorder. The Australian scientists’ strategy could be the first to definitively prove, based on real-time data and location information, that pesticides or parasites have caused a shift in bee flying patterns in specific regions. Currently they are working with the University of Tasmania, Tasmanian Beekeepers Association, local beekeepers in Hobart, and fruit growers to test the strategy, and if successful, it could help save more bees than ever before, while getting to the root of the problem and stopping it before it gets out of control. ■

Woods Hole, USA

Ocean Radioactivity from Fukushima Leak to be Tracked

Our human activity is making the surrounding environment worse. Since the Tohoku earthquake and tsunami crippled Japan’s Fukushima Daiichi nuclear power plant in 2011, concerns have spread among the public that water with traces of radioactive material might be traveling in a plume across the Pacific Ocean toward the west coast of North America. Even though experts say the radiation levels reaching the U.S. coast and Hawaiian Islands will be too low to threaten human health or marine life, the fact is that no U.S. government or international agency is actually monitoring radiation in these places. Now, a scientist at the Woods Hole Oceanographic Institution (WHOI) in Massachusetts is launching a new citizen science project to measure levels of radioactive cesium in water washing up along the West Coast. The study suggested that the radioactive plume

from Fukushima will reach U.S. coastal waters this year, peaking in 2016. But ocean currents off Japan’s eastern coast have most likely diluted the radioactivity to well within safe levels set by the World Health Organization, said study leader Vincent Rossi, an oceanographer and postdoctoral research fellow at the Institute for Cross-Disciplinary Physics and Complex Systems in Spain. The oceans already contain naturally occurring radioactive chemical elements, as well as remnant radiation from nuclear-weapons testing during the 1950s and ’60s. Scientists can take a fingerprint of the Fukushima radiation by precisely measuring the ratio of the chemical variant cesium-137 left by weapons testing, which has a 30-year half-life, to the chemical form cesium-134 from Fukushima, which has a two-year half-life. The U.S. safety limit for cesium levels in drinking water is about 28 Becquerels (Bq), the number of radioactive decay events per second, per gallon (7,400 Bq/cubic meter). For comparison, uncontaminated seawater contains only a few Bq/cubic m of cesium, and much higher levels of other, naturally occurring radioactive elements. ■

Paris, FRANCE

Dwarf Planet Ceres Contains Water

In our human’s thought, if we could find water from the external planets, which means new life also exists there. Scientists have long thought that the dwarf planet Ceres might hold some form of water, but they have only had indirect evidence at best until today. A team led by The European Space Agency has used signal fluctuations to confirm that the asteroid belt planetoid is spewing water vapor from two points on its surface, creating both ice and a rudimentary at-

mosphere. It is not clear what is producing the vapor, although researchers believe that geysers, thawing or icy volcanoes may be responsible. Whatever is behind Ceres’ behavior, the discovery could improve our understanding of how water reached Earth. We will get a much clearer picture of what is happening in early 2015, when NASA’s Dawn probe swings by to map the mini-planet’s water activity in greater detail. ■

Toronto, CANADA

Leopard Teeth, Calf Bones Found in Ruins near Pyramids

The remains of a mansion that likely held high-ranking officials some 4,500 years ago have been discovered near Egypt’s Giza Pyramids. Bones from young cattle and teeth from leopards suggest its residents ate and dressed like royalty. Archeologists excavating a city just 400 meters south of the Sphinx uncovered the house and nearby mound containing the hind limbs of young cattle, the seals of high-ranking officials, which were inscribed with titles like “the scribe of the royal box” and “the scribe of the royal school,” and leopard teeth (but no leopard). The house, containing at least 21 rooms, is part of a city that dates mainly to the time when the pyramid of Menkaure (the last of the Giza Pyramids) was being built. Besides cattle bones the archaeologists found two leopard teeth in the house and another

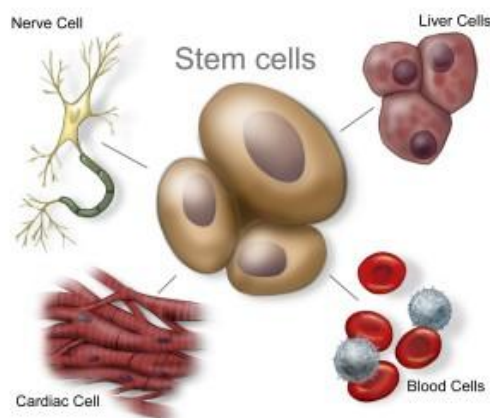


two in the nearby mound. This discovery may help the archeologists identify offering places and dwellings of ancient priests. Since the elite house is full of hind limbs (the remains of offerings), Redding suspects that bone deposits that contain mainly forelimbs would be located in places where the offerings were being made. The complex dates to a bit after the Giza Pyramids were built and may have been constructed at the site of an earlier town where people involved in the building of the Pyramid of Khafre (the second largest pyramid at Giza) lived. ■

London, UK

Breakthrough in Embryonic-Like Stem Cells

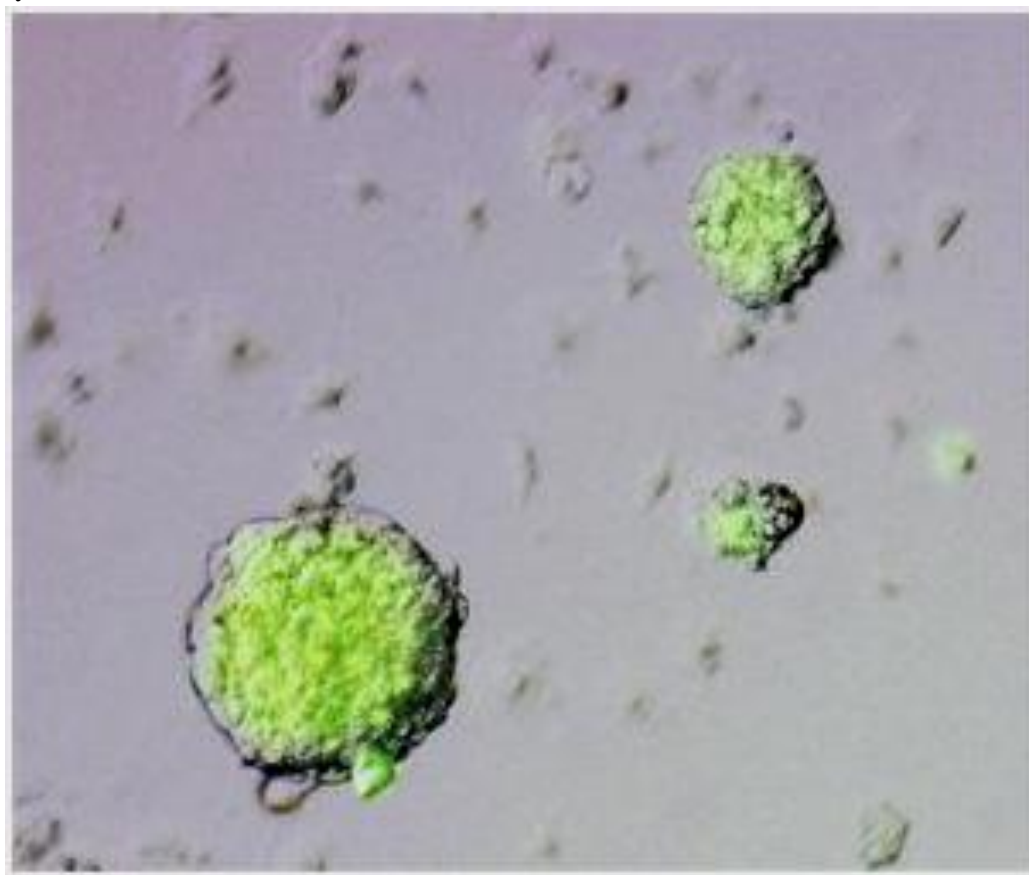
Have you ever heard stem cells? They are new hope for us to conquer some fatal diseases like cancer and degenerative diseases like Alzheimer's disease. In experiments that could open a new era in stem cell biology, scientists have found a simple way to reprogram mature animal cells back into an embryonic-like state that allows them to generate many types of tissue. The research, described as game-changing by experts in the field, suggests human cells could in future be reprogrammed by the same technique, offering a simpler way to replace damaged cells or grow new organs for sick and injured people. Chris Mason, chair of regenerative medicine bioprocessing at University College London, who was not involved in the work, said its approach in mice was "the most simple, lowest-cost and quickest method" to generate so-called pluripotent cells – able to develop into many different cell types – from mature cells. The experiments, reported in two papers in the journal *Nature*, involved scientists from the RIKEN Center for Developmental Biology in Japan and Brigham and Women's Hospital and Harvard Medical School in the U.S. The researchers took skin and blood cells, let them



multiply, then subjected them to stress "almost to the point of death", they explained, by exposing them to various events including trauma, low oxygen levels and acidic environments. One of these "stressful" situations was simply to bathe the cells in a weak acid solution for some 30 minutes. Within days, the scientists found that the cells had not only survived but had also recovered by naturally reverting into a state similar to that of an embryonic stem cell. These stem cells – dubbed Stimulus-Triggered Acquisition of Pluripotency, or STAP, cells by the researchers – were then able to

differentiate and mature into different types of cells and tissue, depending on the environments they were put in. Stem cells are the body's master cells and are able to differentiate into all other types of cells. Scientists say that by helping to regenerate tissue and potentially grow new organs, they could offer ways of tackling diseases for which there are currently only limited treatments. Recent experimental research has seen stem cells used to create a functional human liver and

to create beating heart muscle tissue. There are two main types of stem cells: embryonic ones, harvested from embryos, and adult or iPS cells, which are taken from skin or blood and reprogrammed back into stem cells. Because the harvesting of embryonic stem cells requires the destruction of a human embryo, the technique has been the subject of ethical concerns and protests from pro-life campaigners. Now we have the hope to march for the bright future of the stem cell research. ■





THE BONOI ACADEMY OF SCIENCE & EDUCATION

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ENDOCRINOLOGY AND EPIGENETICS

Epigenetic Changes in the Glucocorticoid Receptor in Adult Offspring from Undernourished Maternity

Maternal nutrition is really important to the development of their offspring. Maybe physical or maybe mental consequences will be resulted in if the mom-to-be continued to be an undernutrition state. What has happened to those offspring because of their mothers' malnutrition? Were there any molecular changes? A recent interesting study led by Dr. Anne White from University of Manchester, UK reported their findings on this topic. They found that moderate changes in maternal nutrition, around the time of conception, signal life-long and tissue-specific epigenetic alterations in a key gene regulating energy balance in the hypothalamus of the adult offspring. Epidemiological data indicate that an adverse maternal environment during pregnancy predisposes offspring to metabolic syndrome with increased obesity, and type 2 diabetes. The mechanisms are still unclear although epigenetic modifications are implicated and the hypothalamus is a likely target. We hypothesized that maternal undernutrition around conception in sheep would lead to epigenetic changes in hypothalamic neurons regulating energy balance in the offspring, up to 5 years after the maternal insult. We found striking evidence of decreased glucocorticoid receptor promoter methylation, decreased histone lysine 27 trimethylation, and increased histone H3 lysine 9 acetylation in hypothalami from male and female adult offspring of undernutrition mothers. These findings are entirely compatible with the increased glucocorticoid receptor

mRNA and protein observed in the hypothalami. The increased glucocorticoid receptor predicted the decreased hypothalamic proopiomelanocortin expression and increased obesity that we observed in the 5-year-old adult males. The epigenetic and expression changes in glucocorticoid receptor were specific to the hypothalamus. Hippocampal glucocorticoid receptor mRNA and protein were decreased in undernutrition offspring, whereas pituitary glucocorticoid receptor was altered in a sex-specific manner. In peripheral polymorphonuclear leukocytes there were no changes in glucocorticoid receptor methylation or protein, indicating that this epigenetic analysis did not predict changes in the brain. ■

Endocrinology
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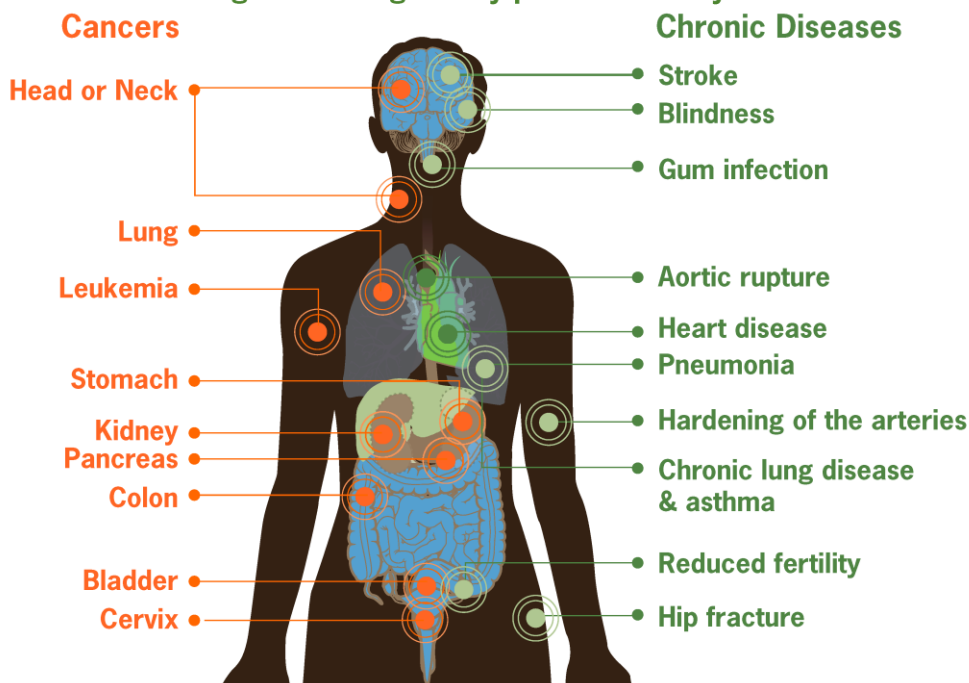
MEDICINE

Mental Benefits from Smoking Cessation

Many smokers want to stop but continue smoking as they believe smoking

Risks from Smoking

Smoking can damage every part of the body



has mental health benefits. Meanwhile, health professionals are reluctant to deal with smoking in people with mental disorders in case stopping smoking worsens mental health. Are these the real things in our life? Smoking is a leading risk factor for the development of cancers and cardiovascular and respiratory diseases. A new systematic review of the currently available data were presented to the journal of BMJ by a joint group led by Dr. Paul Aveyard from University of Nottingham, University of Oxford, University of Birmingham, and King's College London, they demonstrated that smoking cessation is associated with reduced depression, anxiety, and stress and improved positive mood and quality of life compared with continuing to smoke. The effect size seems as large for those with psychiatric disorders as those without. The effect sizes are equal or larger than those of antidepressant treatment for mood and anxiety disorders. In their study, a total of 26 studies that assessed mental health with questionnaires designed to measure anxiety, depression, mixed anxiety and depression, psychological quality of life,

positive effect, and stress were included. Follow-up mental health scores were measured between seven weeks and nine years after baseline. Anxiety, depression, mixed anxiety and depression, and stress significantly decreased between baseline and follow-up in quitters compared with continuing smokers: the standardised mean differences (95% confidence intervals) were anxiety -0.37 (95% confidence interval -0.70 to -0.03); depression -0.25 (-0.37 to -0.12); mixed anxiety and depression -0.31 (-0.47 to -0.14); stress -0.27 (-0.40 to -0.13). Both psychological quality of life and positive affect significantly increased between baseline and follow-up in quitters compared with continuing smokers 0.22 (0.09 to 0.36) and 0.40 (0.09 to 0.71), respectively). There was no evidence that the effect size differed between the general population and populations with physical or psychiatric disorders. From these findings, should we say good-bye to the smoking habit? Yes, we should. As the authors pointed out that whether or not smoking cessation directly causes the observed improvement in mental health, there are direct clinical implications. Smokers can be reassured that stopping smoking is associated with mental health benefits. This could also overcome barriers that clinicians have toward intervening with smokers with mental health problems. Furthermore, challenging the widely held assumption that smoking has mental health benefits could motivate smokers to stop.■

BMJ 2014;348:g1151.

MATHEMATICS

Closed Subspaces of a Hilbert Space

A Hilbert space, named after Dr. David Hilbert, generalizes the notion of Euclidean space. It extends the methods of vector algebra and calculus from the 2-D Euclidean plane and 3-D space to spaces with any finite or infinite number of dimensions. A Hilbert



space is an abstract vector space possessing the structure of an inner product that allows length and angle to be measured.

Moreover, Hilbert spaces are complete: there are enough limits in the space to allow the techniques of calculus to be used. As a complete normed space, Hilbert spaces are by definition also Banach spaces. As such they are topological vector spaces, in which topological notions like the openness and closedness of subsets are well-defined. The important thing is the notion of a closed linear subspace of a Hilbert space that, with the inner product induced by restriction, is also complete (being a closed set in a complete metric space) and therefore a Hilbert space in its own right. In a new presentation by Dr. Lucijan Plevnik from the Institute of Mathematics, Physics, and Mechanics and Dr. Peter Šemrl from University of Ljubljana, Slovenia, they studied and mapped the preserving complementarity of closed subspaces of a Hilbert space. In their study, they summarized the whole research as letting \mathcal{H} and \mathcal{K} be infinite-dimensional separable Hilbert spaces and $\text{Lat } \mathcal{H}$ the lattice of all closed subspaces of \mathcal{H} . They described the general form of pairs of bijective maps $\phi, \psi: \text{Lat } \mathcal{H} \rightarrow \text{Lat } \mathcal{K}$ having the property that for every pair $U, V \in \text{Lat } \mathcal{H}$ they had $\mathcal{H} = U \oplus V \iff \mathcal{K} = \phi(U) \oplus \psi(V)$. Then they reformulated this theorem as a description of bijective image equality and kernel equality preserving maps acting on bounded linear idempotent operators. Several known structural results for maps on idempotents are easy consequences.■

Can J Math 2014,

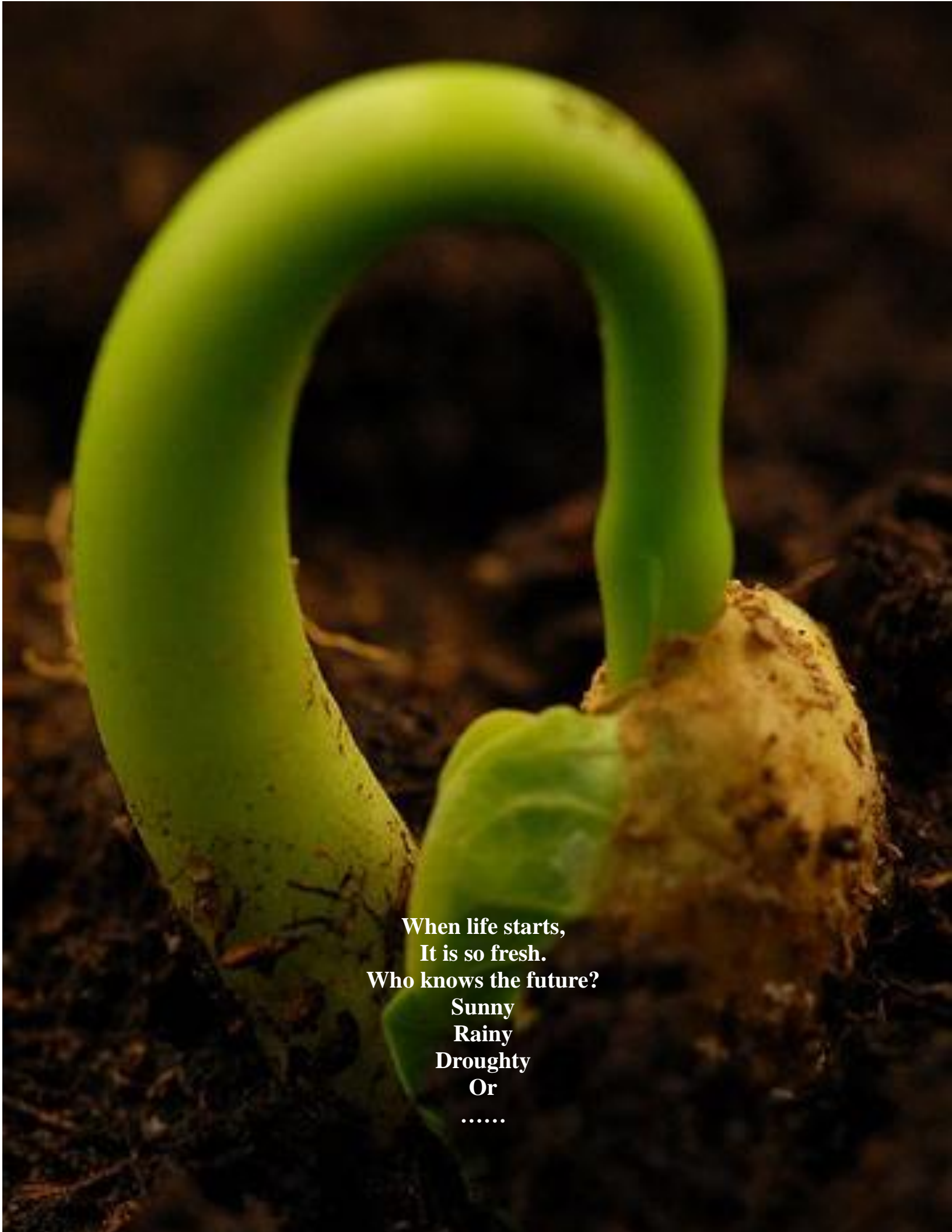
<http://dx.doi.org/10.4153/CJM-2013-025-4>, in press

PSYCHOLOGY AND SOCIETY

The Verbal Mimicry to Influence Prosocial Behavior

Prosocial behavior, also known as the voluntary behavior intended to benefit others, is a social behavior that benefit other people or society as a whole including helping, sharing, donating, co-operating, and volunteering. These actions may be motivated by empathy and by concern about the welfare and rights of others, as well as for egoistic or practical concerns. As the also called unintentional mirroring, the chameleon effect usually applies to people who are getting along so well, each tend to mimic each other's body posture, hand gestures, speaking accents, among others. Research on the chameleon effect has demonstrated that social benefits, such as liking, safety, rapport, affiliation, and cohesion can be evoked through nonverbal imitation, such as body language and mannerisms. A new study conducted by a group headed by Dr. Wojciech Kulesza from University of Social Sciences and Humanities, Poland, and Florida Atlantic University, USA reported an echo effect that affects the prosocial behavior. In their study, the researchers enrolled 330 currency exchange office customers as the participants, and all of them were assigned into one of three experimental and two control conditions. Careful attention to research design produced results that address issues raised in the mimicry literature and more clearly define the boundaries of verbal mimicry. The results demonstrated that while repetition of words is important in increasing an individual's tendency to perform prosocial behaviors, the order in which they are repeated back is not; verbal mimicry is more powerful mechanism than dialogue; and, for nonmimicry control conditions, no response produces the same result as a brief response. So from this study, what can you learn?■

J Lang Soc Psychol 2014; 33(2):183.

A close-up photograph of a young green seedling with a curved stem emerging from dark soil. The seedling has a thick, pale green stem that curves upwards and then back down towards the soil. The base of the stem is covered in a layer of light brown soil. The background is dark and out of focus, showing more soil and some small roots.

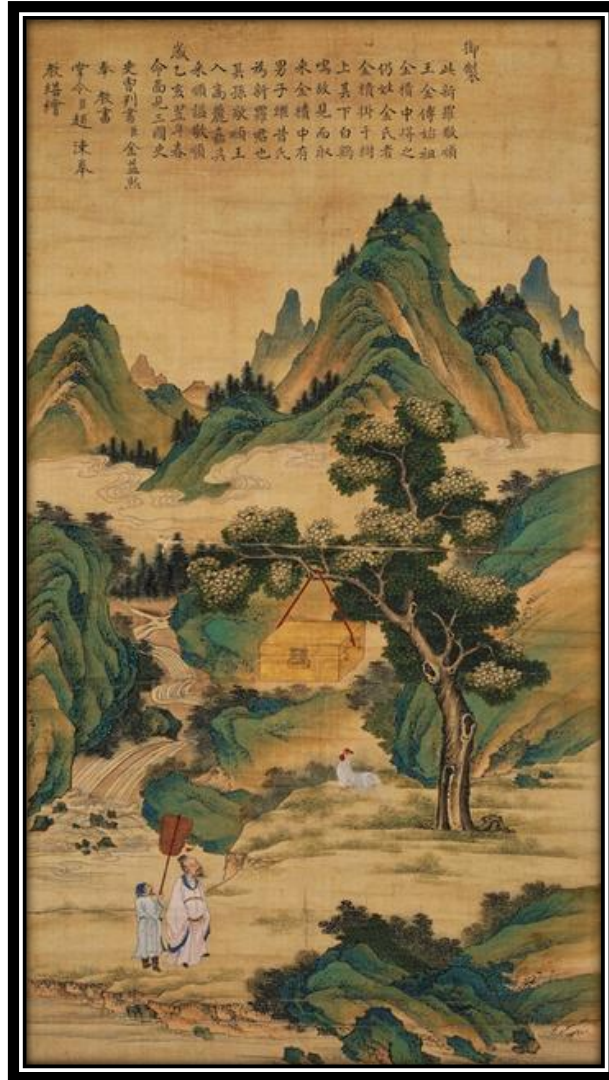
**When life starts,
It is so fresh.
Who knows the future?
Sunny
Rainy
Droughty
Or
.....**

Love the Wave
Love the Earth



The Birth of Kim Al-ji

By Jo Sok (1595-1668)



The Birth of Kim Al-ji, by Jo Sok (1595-1668). On Silk, 105.5x56cm, Period: Joseon Dynasty (17th century).

This exquisite work, filled with vivid green and blue landscapes, portrays the legendary birth of Kim Al-ji, the founder of one of the three royal families of the Silla Kingdom (57 BCE - 935 CE). According to Korean lore, the baby Kim Al-ji was found in a mysterious golden box in a forest in Gyeongju. An auspicious white rooster, depicted with fine brush strokes and bright mineral colors, is shown crowing near the box. This painting reflects the decorative style of 17th century royal court painters. Stored in the Natinal Museum of Korea.



Who feeds us?

RIOT

TODAY'S WORLD

who should pay for this...



FREEDOM



Marijuana Legalization: Still an Open Question?

Frederick F. Wang*, Ayman T. Bridgewater*, Michael P. Worden*

Marijuana, a well-studied drug in scientific field, now has been being enabled to be a legal recreational substance by some U.S. states that evoked a wide discussion on its potential effects on our future life. A majority of people hold negative points on this drug; most of them are scientists, educators, physicians, and parents who have kids. However, another huge party who positively advocates the pot legalization is the people like businessmen, retailers, planters, and drug users. Along with the recent approval for banks allowed to open accounts for marijuana business, as well as the vigorous appeal for the drug's legalization, can the science win over the battle? For the drug itself, we need objectively to evaluate its possible effects. Everything has two sides like a double-edged sword, if you take the yin, and the yang is also there, and then is vise versa. Maybe marijuana legalization for recreational use was an out and out wrong, and maybe it was a wise decision. Who knows? The only thing we can do today is let time tell us the answer.■

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Keywords: Marijuana – Legalization – Recreation – Effects – Science

NOTHING is impossible. Astounding news was released that the ever illegal marijuana has been approved for allowing people to legally purchase for recreational use. Yes, it is a reality. On January 01, 2014, Colorado became the first state in the USA to legalize marijuana deal, with follower Washington State to do the same. Currently, 20 states and the District of Columbia allow the use of marijuana for medical purposes. This signals the possibility that other states would imitate Colorado and Wash-

ington to make a greater legalization of the drug.

For what purpose holding for legalizing marijuana, it is certain, at least in part, that the legalization will likely have both positive and negative consequences. Even though we cannot predict the possible effects of this groundbreaking change on public health and safety, the businessman now is seeking evidence for supporting the act. Once again, “the business of America is business” became true. From drugsters to marijuana venders, they all are happy for the win-win business; and from marijuana plant-

ing to banking services, they all wish the pot could be removed from the Schedule 1 list of drugs in the Controlled Substance Act.

Colorado's action right now looks all going smoothly. It marked the first time that the drug could be sold commercially for nonmedical purpose. However the biggest concern of critics is whether the new policy will increase teen use or lead to marijuana trickling out of the state. We cannot foresee these; they may take months or years to assess. In further, what consequences of this policy would make on the society, economy, safety,

science and life are still unclear. We can sense some kinds of change from the knowledge we have now that the marijuana use would increase in the near future and it would also increase other types of risks on the science view.

Trend of Marijuana Use

Of the tendency of the marijuana use from its legalization will depend, in large part, on how many people start using the drug once it becomes legal. Yes, it is almost certain that the shift from illegal sales to a market-based system could open the flood gates to new users.

According to the National Institute on Drug Abuse, over 30% of Americans between the ages of 18 and 25 reported using marijuana in the past year of 2012. For 12- to 17-year-olds, usage was nearly 14%. The direct effect of the legalization will be only on the increase in these numbers: from a non-smoker to a smoker, and from a general user to a heavy user. Ever though the laws of the Colorado prohibit the sale of marijuana to minors and teenagers, it is dif-

ficult to guarantee these two types of people will not be deterred totally. You know, we are social men, we communicate every day and are connected each other.

Legalization of recreational marijuana is a changing point, though the federal law still prohibits banks and credit card companies from processing pot business transactions, and this may all be about to change. Buying the weed from an authorized dispensary is legal in some states, but banking laws clearly have not caught up. Right now, the banking business is looking for exit to make the services available to this industry. An extra key factor is that the governors are keen to tap into the potential tax receipts from marijuana sales, which will lead banks to lend money to legitimate marijuana businesses, and to set up private equity firms that can provide start-up financing and capital to these businesses. In one such move, executives at *High Times* magazine have created the HT Growth Fund and aim to raise \$100 million fund for pot-related start-ups. All these worry now has become reality, US regulators on February 14, 2014 told

banks that they can allow marijuana dealers to open accounts, as states around the country begin to legalize the drug for medical and in some cases even recreational use.

The estimating value of the legal marijuana is \$1.4 billion. While pot is a legitimate business, many marijuana customers still get their pot from their illicit dealers rather than from the legitimate dispensaries largely due to the high price of the legal weed from which there the business needs pay high sales and excise taxes. This is also the reason why a robust underground market still operates in many of the same areas where the weed sale was legalized.

Other states like Florida is ready to change the current drug situation by collecting voter signatures to put the proposal of "supporting medical marijuana constitutional amendment" to be balloted which means if the petition is approved by 60% of voters in November 2014, Florida would become the first southern U.S. state to approve marijuana for medical use, joining 20 other states (see Table 1).

Table 1. Historical Records on Changes in Marijuana Laws in the U.S.*

Purpose	States	Action	Action Time	Laws	
Recreation	Colorado	Decriminalized recreational use	2012	Rules for growers, processors, retail sellers and testers of the drug	
	Washington	Recreational-use stores opened	2014		
	California	Decriminalized recreational use	2012	Rules for growers, processors, retail sellers and testers of the drug	
	Alaska	Advocates of legalization	2016		
	Arizona				
Medicine	Oregon	Proposition 215	1996	The first state to allow for the medical use of marijuana Patients can grow their own pot, obtain it from a dispensary, or both	
	California				
	Washington, D.C. + Another 18 states	In ready	2011		
	New York				
Personal Cultivation	Hawaii	Allow at least some patients to grow limited quantities of marijuana for themselves			
	Montana				
	Maine				
	+ Another 10 states				
	Arizona				
Dispensaries	Massachusetts	Permit medical pot dispensaries		Require cultivation person to live at least 25 miles from a dispensary	
	Washington, D.C. + Another 15 states			Limit it to those physically, financially or geographically encumbered from buying from a dispensary	
	Connecticut			Patients can obtain the drug	
	Illinois		2015	Patients can obtain the drug	
	New Hampshire				
	+ Another 4 states				
	Montana	Have dispensaries operating within their borders Some dispensaries grow their own pot, while others get it from state-licensed growers or from patients			
	Michigan				
Washington					

*Note: Under federal law, marijuana remains illegal for recreational use.

Consequences of Increased Use

What kinds of consequences would be resulted from the legalization sale of the drug? How much you know about the weed from the point of science? We all know that business is not for science, but science in contrast is for business well. The fact is that marijuana has several well-studied effects on public health and safety. Currently, the public is largely misinformed concerning the health and behavioral effects of marijuana. In fact, science knows much about the drug, but people know little.

First of all, marijuana is a hallucinogenic drug, the major reason why a lot of people seeking it for recreation purpose. All its hallucination effects derive from the drug's role in the central nervous system (CNS). Therefore, bear in mind that marijuana is addictive. According to the National Institute for Drug Abuse, estimates suggest that one in nine users become addicted to marijuana. For people who start using as teenagers, this increases to one in six.

Before the drug became popular for its legalization, I just thought that marijuana is an addictive drug like heroin and lysergic acid diethylamide (LSD). However, the fact is not the same as I thought. It became one legalized drug you can get only if you want to. Although the marijuana dependence is not that life-threatening, it can lead to very serious adverse consequences for individuals in terms of their functioning in school, at work, and in relationships. Moreover, the cognition function can be adversely affected if the drug was compulsively used.

Second, teenagers, the future hope of the society, are in particular susceptible to the negative effects of marijuana because their brains are still developing. Can you believe one child has a high IQ point if he or she using the drug? Our governors, if you think your children could resist the temptation from their peers, and if you think your "wise" decision could

Knowledge Box

Current Scientific Knowledge about Marijuana: For marijuana, science can tell you something new from ample research evidence. OK, let science speak. We need weigh in and out the positive and negative effects of marijuana use for our life, health, learning, and relation.

- ☑ Cannabis products can alleviate symptoms of depression, glaucoma, spasms, and nausea associated with cancer and AIDS.
- ☑ Cognitive impairment is one of the most important side effects associated with cannabis drug abuse, as well as the serious issue concerning the therapeutic use of cannabinoids.
- ☑ Marijuana can impair brain development, memory and lung function, and lead to addiction.
- ☑ Pregnenolone, a naturally occurring hormone, acts as spontaneous defense in the brain against the high caused by marijuana and could be useful in preventing addiction through reducing the activity of a particular brain molecule called the type-1 cannabinoid receptor (CB1).
- ☑ The high doses of cannabis raised the brain's level of pregnenolone, which blocked the harmful effects of THC, the psychoactive ingredient in marijuana, on the brain.
- ☑ In alcoholism, cocaine and heroin dependence, striatal dopamine D2/3 receptor is in low availability and the release in ventrostriatal dopamine is low. However, cannabis dependence is an exception among commonly abused drugs in that it is not associated with blunting of the dopamine system.
- ☑ Baclofen can reduce cannabis withdrawal symptoms and the subjective effects of cannabis.
- ☑ Mothers' marijuana use is an important component of adolescent use, even after accounting for characteristics of the child and the intergenerational family context.
- ☑ High frequency use of cannabis predicts a decreased satisfaction with life and one's own academic and professional achievement as well as an increased use of other substances.
- ☑ Early cannabis use is associated with the occurrence and the severity of psychotic symptoms during cocaine intoxication.
- ☑ Cannabis can increase risk of squamous cell carcinoma of the tongue, larynx, and possibly lung.
- ☑ An earlier age of onset of schizophrenia has been identified as a poor prognostic indicator. Cannabis use is associated with an earlier age of onset of schizophrenia, and the gender difference in age of onset is reduced among cannabis smokers.
- ☑ Marijuana-related problems are associated with marijuana use frequency. Concurrent alcohol use impacts the experience of negative consequences from marijuana use in young women. Discussions of marijuana use in young adults should consider the possible potentiating effects of alcohol use.
- ☑ Overlapping genetic influences underlie the association between early-onset cannabis use and other illicit drug use as well as depression and suicide.
- ☑ Nabiximols (Sativex) attenuates cannabis withdrawal symptoms and improved patient retention in treatment. In this situation, the placebo also was as effective as nabiximols in promoting long-term reductions in cannabis use following medication cessation.
- ☑ The endocannabinoid system is widespread throughout the central nervous system and its CB1 plays a crucial role in preventing the neurotoxicity caused by activation of glutamate N-methyl-D-aspartate receptors (NMDARs). Indeed, it is the activity of NMDARs themselves that provides the demands on the endogenous cannabinoids in order to control their calcium currents.
- ☑ Cannabinoid hyperemesis is a relatively rare but significant adverse effect of chronic marijuana use characterized by severe, cyclic nausea, vomiting, and abdominal pain and marked by compulsive hot-water bathing for temporary symptom relief.
- ☑ The modulation of cholinergic activity by CB1 receptor activation is one mechanism that regulates the synthesis of plasticity-related proteins.
- ☑ Cannabis use is common in patients with inflammatory bowel disease and subjectively improved pain and diarrheal symptoms. However, cannabis use was associated with higher risk of surgery in patients with Crohn's disease. ■

People's Voice

Nearly 30% of students reported ever having used marijuana at college entry. Among students who had never used marijuana prior to college, 8.5% initiated use during freshman year. This means we need target substance abuse prevention programs on college campuses. Let's listen to the voice from people.

David Pearce from Tucson, Arizona

Your editorial is generally informative and factual. However, it still manages to demonize pot with comments such as "problem users," "marijuana-related crime," "more violence" and increased "teenage use." There are no studies or other proof that merely smoking marijuana incites crime or violence. Violence with marijuana has only been driven by the profits from the illegal growing, distribution and sales of the drug. Further, there will be a reduction in pot use by teenagers because it will only be sold to adults.

George W. Iliff from Port St. Lucie, Florida

In the closing line of the editorial you say "better, then, to let Colorado go first, and watch what happens." When skiing avalanche chutes at A-Basin, it's the same principle-let the snowboarders go first and watch what happens.

Steve Juhan from Tucson, Arizona

The shortsightedness of Colorado voters in legalizing the sale and use of marijuana astounds me. One consequence of this law that I have not seen discussed is the effective exclusion of what appears to be a growing portion of the younger generation from a major part of the job market. Colorado may have accepted pot smoking, but industry has not. One still has to pass a drug test to be considered for employment in most of the major industries, including natural resources, energy, manufacturing-and yes, even environmental-and failure to pass a drug test while employed can constitute grounds for banishment from the job site at best, or immediate dismissal. Since marijuana can be detected in the blood for several weeks, this is *not* the same as having a few drinks. It seems unlikely that safety managers will consider loosening strictures in the litigation-happy world we now live in, particularly in the wake of various incidents in recent years. Future job seekers from Colorado who are rejoicing today may be in for a major reality check when they are handed a plastic cup in their first new employee-orientation session. ■

help to pave your way to a promotion because of the sales taxes revenue, and if, that means you are irresponsible and disqualified for being to be leaders. Maybe you got appeal from some bad businessmen, or maybe you did not consult this to scientists for scientific view, or maybe you yourself are a drug user, no matter what kinds of reasons you had upon the marijuana legalization, this is really a terrible case that might change our world from the normal to the aberration.

Third, the legal use of marijuana would increase the number of people who drive while high. Do you think what would happen for these guys? Even though the precise correlation between marijuana use and traffic accident is still unclear, its long-term effects on traffic safety are almost predictable. Being high and driving would increase the risk of accidents because of the drug can affect the driver's motor performance, perception, and concentration. It is not only dangerous for the drug-use drivers, but also for other drivers.

Fourth, from the point of the medical science, marijuana use during pregnancy could affect a baby's brain development by interfering with how brain cells are wired. Animal research showed that marijuana can interfere with the formation of connections between nerve cells in the cerebral cortex, the part of the brain responsible for higher thinking skills and forming memories. Furthermore, these effects of prenatal marijuana exposure could even last into adulthood. The drug could have direct effects, or it could sensitize the brain to future drug exposure or neuropsychiatric illnesses. Besides, prenatal cannabis disrupts synapses critical for higher order executive and cognitive function. Cumulating evidence showed that children exposed to marijuana in the womb may have an increased risk of showing cognitive effects, seeking out drugs, or having attention deficit disorder, anxiety or depression. As thus the pregnant women should avoid marijuana,



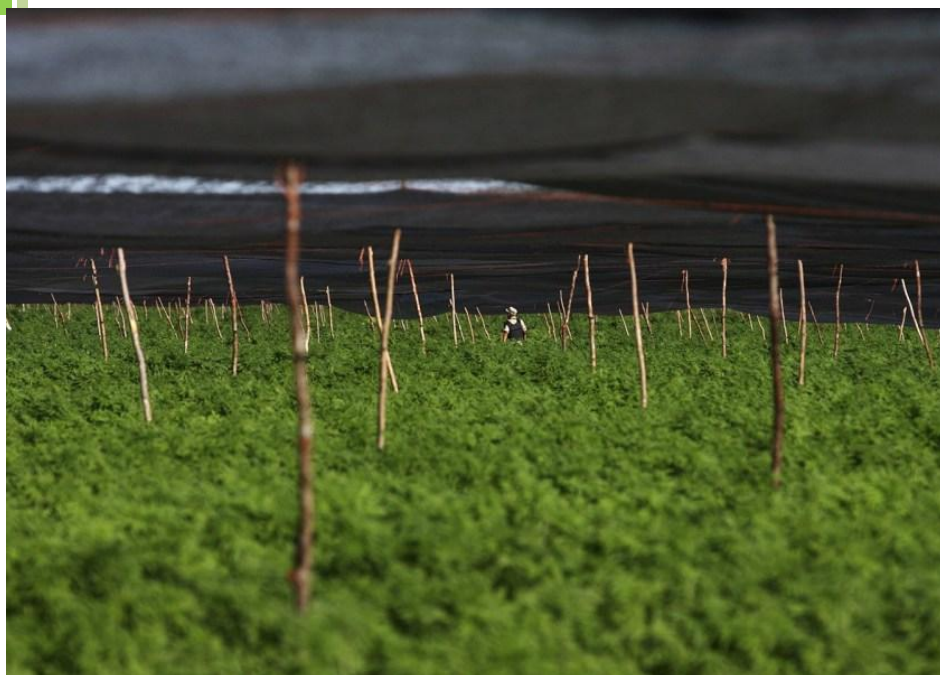
and if the pregnant has used the drug, they should be made aware of the potential impact on the brain development of their children.

Last but not the least, the consumption of marijuana also can increase the risk of heart attack and stroke for adults with cardiovascular disease and acute psychotic episodes in people with a history of schizophrenia.

The Businessman's View

From the point of view of businessmen, there is no proof marijuana incites crime or violence. They appeal for the legalization and applaud for the action. Let us have a look at their contrast point: tens of thousands of Mexicans and South Americans have died due to the draconian drug laws that make hard drugs and marijuana illegal. Tobacco, which is legal, kills 440,000 people annually. Alcohol, another legal drug, kills another 88,000 yearly. Marijuana kills exactly nobody yearly. So why don't you go on a campaign to outlaw both tobacco and alcohol? Oh, right, we have already tried outlawing alcohol during the Prohibition era, and that was such a failure that the constitutional amendment outlawing alcohol had to be repealed by another constitutional amendment.

They thought legalize pot was a wise action. Yes, it is understandable that entrepreneurs, like water finding a path, will always figure out a way to respond to business opportunities. Fairness is one big issue they thought to marijuana. If it was justified for the cannabis, the smoking and alcohol also should be banned equally because in the 48 states that do not



permit recreational use of marijuana, smoking tobacco, which causes cancer, is legal. In comparison, smoking weed, which is used to treat the symptoms of cancer treatments, is not. Moreover, some experts believe that alcohol, which is legal in virtually all parts of the United States, is more harmful than marijuana, which is illegal in almost all of the country. At first sight, all these description is reasonable. We all know one fact is that if you want to find supporting evidence for anything, surely you can.

Cultural attitudes, fairness, economics, and entrepreneurial behavior all point to extension of this trend toward legalization. Economic benefits from making pot legal have become one hot topic for policymakers. From them marijuana is a “money plant” that can bring back or offset the financial deficit. Entrepreneurs find and pursue market opportunities wherever they are. Making a business illegal doesn’t get rid of the efforts of entrepreneurs to pursue it. For them, money is everything. We even can hear some strange and absurd argument concerning the pot legalization. They argued that by making pot legal, police can focus their attention on stopping more destructive illegal drugs like cocaine, heroin, and LSD, which are more likely to cause crime

and health problems. That would help financially strapped states.

“Pursuing marijuana business will make you rich”, some supporters for the legalization declared that it was an opportunity to become rich via getting in this business. It is difficult to describe the exuberance that pervades a new industry, particularly one that involves the cachet of a newly legalized drug like marijuana. Of the two dozen or so people I spoke with in the business, every last one of them was convinced that they were on the road to riches. How long will this opportunity last? That remains to be seen, but one thing is for certain: the countdown has begun.

The trend, whether you like it or not, toward fully legalized marijuana is here and it is likely here to stay. To the enterprising investor, they just thought everyday how can they get in on this potential money train. At the end of the day, despite the magnetic attraction of a new and burgeoning industry, most investors including the passive investors would be better off sticking to more traditional investment alternatives.

What are We Facing?

The journey is just beginning. The negative consequences, business opportunities, and worries about its legalization all need time to be seen.

The Seattle Police Department, grappling with how to handle legal marijuana, is considering whether off-duty officers should be allowed to moonlight as security guards for the city’s first recreational pot shops when they open later 2013. As the Denver Police Department to bar off-duty officers from working for legal marijuana businesses, The Seattle department faces the same questions, just one of many issues law enforcement agencies are grappling with after Washington State and Colorado voted in 2012 to legalize recreational pot.

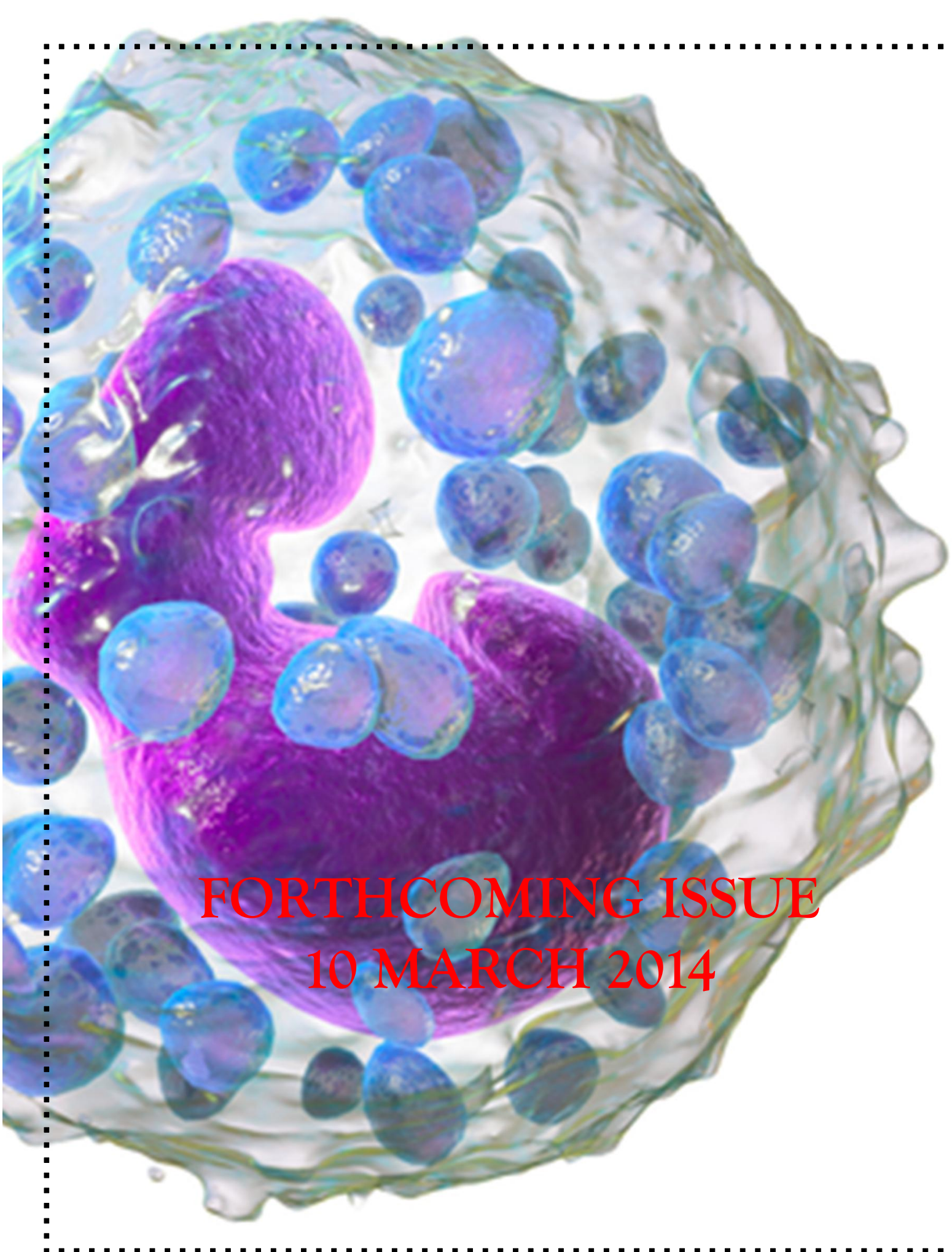
Like liquor, off-duty officers currently can provide security to it and grocery stores that sell alcohol because drinks are not consumed on the premises, but a police policy prohibits officers from working in bars or nightclubs where alcohol is consumed. The off-duty policy would eventually be amended to specifically address whether or not officers are allowed to work for marijuana retailers.

Another issue is that marijuana tourism will also get close scrutiny, with the potential for conflict as tourists may forgetfully bring back some souvenirs from the state that aren’t legal in other states.■





Working like a worker bee?
Relax yourself.....



FORTHCOMING ISSUE
10 MARCH 2014



**When you face the eruption
Do you feel the ending of the world?**

AUTHOR GUIDE

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Poem: *Science INSIGHTS®* is not only for the regular publications of science and education, but also for the aesthetics and rhythm of our surroundings. If you are interested in this form of literary art, write it and publish it. Let science and education show more enjoyable elements. No limitation on the count of words for Poem with maximum of 3 authors. No peer review is needed for Poem.

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