Department of Medical Research

Bulletin

Vol. 31, No. 2 **Published Since 1986** **October, 2018**

CONTENTS

The objective of this Bulletin is to disseminate international news about health and medicine, developments, activities in medical and health research in DMR. The Bulletin is published monthly and delivered to township hospitals.

The Editorial Committee, therefore, invites contributions concerning information about research activities and findings in the field of medicine and health.

Please address all your correspondence to:

Library & Publication Division
Department of Medical Research
Ministry of Health and Sports

No. 5, Ziwaka Road
Dagon Township, Yangon 11191
Email: publicationdmr@gmail.com
☎375447, 375457, 375459 Ext:123

Published by the Editorial Committee
Department of Medical Research

Restricted for Internal Use Only

Highlights on Useful Research Findings Applicable to Health

Factors Determining on Utilization of Unskilled Birth Attendants among Rural Women in Ayeyawady Region

An unskilled birth attendant means a birth attendant who is not recognized as a skilled provider. Throughout history traditional birth attendants (TBAs) have been the main birth attendants for women during childbirth in rural area of developing countries.

A community based cross-sectional descriptive study (both quantitative and qualitative methods) was used to study factors determining on utilization of unskilled birth attendants (UBA) among rural women in Ayeyawady Region in 2017. Respondents were rural women who had childbirth within three years and total of 310 respondents in quantitative and 12 indepth-interviews in qualitative were conducted. Ethical consideration was approved by University of Public Health, Yangon. Majority were 25-34 years (50.8%), pregnant 2 to 4 times (54%), attained up to primary education level (72.9%), farmer (33.5%), Buddhist (92.6%) and Kayin ethnic (52.3%).

Most of women (57.7%) were residing in near the health center and 50% had health care person in their village. The proportion of women utilization of UBAs was 45.2% among them. Factors determining on utilization of UAB in this study were respondents' number of previous pregnancy ($p<0.001$), number of children ($p<0.001$), education level ($p<0.001$), occupation ($p<0.001$), ethnicity ($p<0.05$), religion ($p<0.01$), monthly family income ($p<0.01$), distance to nearest health centre ($p<0.001$) and attitude on TBAs ($p<0.05$), with statistically significant at 95% confident interval.

From the qualitative analysis, the seven key themes were emerged: accessibility, economic reason, services offered by UBAs, social welfare services, cultural belief, trustworthy and different performance between TBAs and AMWs. The findings in this study indicated that proportion of the utilization of UBAs was similar to Myanmar Demography and Health Survey and Local Statistics.

The results indicated that UBAs still have a role to play in the community in maternal care services. Therefore, policy makers and health care providers should emphasize on UBAs such as training and incorporating. Moreover, they should be focused on the acceptability, accessibility, availability and quality of UBAs for reduction of maternal morbidity and mortality and leading to safe motherhood.

ဧရာဝတီတိုင်းဒေသကြီး ကျေးလက်ဒေသတွင် နေထိုင်သူအမျိုးသမီးများအတွင်း မကျွမ်းကျင်သော မွေးဖွားသူများအား အသုံးပြုမှုအပေါ် လွှမ်းမိုးသည့်အချက်အလက်များကို လေ့လာခြင်း

မကျွမ်းကျင်သော မွေးဖွားသူဆိုသည်မှာ ကျွမ်းကျင်သူအဖြစ်သတ်မှတ်ထားခြင်းမရှိသော မွေးဖွားသူများကိုဆိုလိုသည်။ ရေးအစဉ်အဆက်တည်းက အရပ်လက်သည်များသည် ဖွံ့ဖြိုးဆဲနိုင်ငံရှိ ကျေးလက်ဒေသများတွင် အဓိကမွေးဖွားသူများအဖြစ်တည်ရှိခဲ့ကြသည်။ ဤသုတေသနသည် ဧရာဝတီတိုင်းဒေသကြီး ကျေးလက်ဒေသတွင် နေထိုင်သူ အမျိုးသမီးများအတွင်း မကျွမ်းကျင်သော မွေးဖွားသူများအား အသုံးပြုမှုအပေါ် လွှမ်းမိုးသော အချက်အလက်များကို ၂၀၁၇ ခုနှစ်တွင် လေ့လာဆန်းစစ်ထားသော cross-sectional descriptive study (both quantitative qualitative methods) တစ်ခုဖြစ်ပါသည်။ ကျေးလက်ဒေသရှိ လွန်ခဲ့သောသုံးနှစ်အတွင်း ကလေးမီးဖွားခဲ့ဖူးသည့် အမျိုးသမီးစုစုပေါင်း ၃၁၀ ဦး ကို တစ်ဦးချင်းမေးခွန်းများမေးမြန်းပြီး ပါဝင်သူများထဲမှ အမျိုးသမီး ၁၂ ဦး အားတစ်ဦးချင်း အသေးစိတ်မေးမြန်းမှုပြုခဲ့ပါသည်။ ပြည်သူ့ကျန်းမာရေးတက္ကသိုလ်၊ ရန်ကုန်သုတေသနကျင့်ဝတ်ကော်မတီ၏ ခွင့်ပြုချက်အားလည်းရရှိပြီးဖြစ်ကြပါသည်။ အများစုမှာ အသက် ၂၅ နှစ်မှ ၃၄ နှစ်အတွင်း ၅၀.၈ ရာခိုင်နှုန်းရှိကြပြီး ကိုယ်ဝန်(၂) ကြိမ်မှ (၄) ကြိမ် ၅၄ ရာခိုင်နှုန်းဆောင်ဖူးကြသည်။ အများစုမှာ အခြေခံပညာမူလတန်းတက်ရောက်ဖူးသူများ ၇၂.၉ ရာခိုင်နှုန်းဖြစ်ပြီး လယ်/ကိုင်းလုပ်ကိုင်သူ ၃၃.၅ ရာခိုင်နှုန်း၊ ကရင် ၅၂.၃ ရာခိုင်နှုန်း၊ ဗုဒ္ဓဘာသာဝင် ၉၂.၆ ရာခိုင်နှုန်းများဖြစ်ပါသည်။ အများစု ၅၇.၇ ရာခိုင်နှုန်းမှာ ကျန်းမာရေးဌာနနှင့် အနီးအနားတွင် နေထိုင်ကြပြီး ၅၀ ရာခိုင်နှုန်းမှာ ရွာတွင် ကျန်းမာရေးဝန်ထမ်းရှိကြောင်းတွေ့ရှိရသည်။

သုတေသနတွင်ပါဝင်သူများ၏ ၄၅.၂ ရာခိုင်နှုန်းမှာ မကျွမ်းကျင်သော မွေးဖွားသူများနှင့် မွေးဖွားထားသူများဖြစ်နေသည်ကို တွေ့ရှိရပါသည်။ မကျွမ်းကျင်သော မွေးဖွားသူများအပေါ် အသုံးပြုမှုသည် ယခင်ကိုယ်ဝန်ဆောင်ဖူးသည့် အကြိမ်အရေအတွက် ($p<0.001$)၊ ကလေးဦးရေ ($p<0.001$)၊ ပညာအရည်အချင်း ($p<0.001$)၊ အလုပ်အကိုင် ($p<0.001$)၊ လူမျိုး ($p<0.05$)၊ ကိုးကွယ်သည့်ဘာသာ ($p<0.01$)၊ မိသားစုဝင်ငွေ ($p<0.01$)၊ ကျန်းမာရေးဌာန၊ အကွာအဝေး ($p<0.001$)နှင့် အရပ်လက်သည်များအပေါ်ထားသော အမြင် ($p<0.05$)တို့နှင့် နီးနွယ်ဆက်စပ်နေကြောင်း တွေ့ရှိရပါသည်။ တစ်ဦးချင်းအသေးစိတ်မေးမြန်းမှုတွင် အဓိကအချက်ကြီး (၇)ချက်ဖြစ်သည့်လက်လှမ်းမီမှု၊ ငွေရေးကြေးရေး၊ မကျွမ်းကျင်သောမွေးဖွားသူများ၏ ကျန်းမာရေးဝန်ဆောင်မှုများ၊ လူမှုရေးဝန်ဆောင်မှုများ၊ ရိုးရာယုံကြည်မှု၊ မကျွမ်းကျင်သော မွေးဖွားသူများအပေါ် ယုံကြည်လက်ခံမှုနှင့် အရပ်လက်သည်နှင့် အရန်သားဖွားဆရာမများ၏ လုပ်ရည်ကိုင်ရည် ကွာခြားချက်တို့ကို သုံးသပ်တွေ့ရှိရပါသည်။ ဤသုတေသနတွင် တွေ့ရှိခဲ့သည့် မကျွမ်းကျင်သော မွေးဖွားသူများအပေါ် အသုံးပြုသည့်နှုန်းမှာ မြန်မာနိုင်ငံ လူဦးရေနှင့်ကျန်းမာရေးဆိုင်ရာစစ်တမ်းနှင့် ဒေသတွင်းစာရင်းအင်း အချက်အလက်များနှင့် ကိုက်ညီသည်ကိုတွေ့ရသည်။

စာတမ်းတွင် တွေ့ရှိချက်များအရ မိခင်ကျန်းမာရေးစောင့်ရှောက်မှုလုပ်ငန်းများတွင် မကျွမ်းကျင်သော မွေးဖွားသူများ၏ အခန်းကဏ္ဍမှာပြည်သူလူထုအတွင်း အရေးပါလျက်ရှိနေသေးသည်ကိုတွေ့ရသည်။ ထို့ကြောင့်မူဝါဒချမှတ်သူများနှင့်ကျန်းမာရေးစောင့်ရှောက်မှုပေးသူများသည် မကျွမ်းကျင်သောမွေးဖွားသူများအပေါ်သင်တန်းပေးခြင်း၊ ပူးပေါင်းဆောင်ရွက်ခြင်းများ ဦးတည်ချမှတ် ဆောင်ရွက်သင့်ပါသည်။ ထို့အပြင် မကျွမ်းကျင်သော မွေးဖွားသူများနှင့် ပတ်သက်သည့် လက်ခံမှု၊ လက်လှမ်းမီမှု၊ ရရှိနိုင်မှုနှင့် ကျွမ်းကျင်မှုတို့ကို ဆန်းစစ်လေ့လာခြင်းအားဖြင့် မိခင်သေနှုန်းကိုလျှော့ချနိုင်ပြီး လုံခြုံစိတ်ချမိခင်ဘဝကို အရောက်လှမ်းနိုင်မည်ဖြစ်ပါသည်။

Reference: Moh Moh Win, Min Ko Ko, Thida Aung, et al. The 46th Myanmar Health Research Congress Programme & Abstracts: 46.(Third Prize for Health Systems Research)

Abstract of Research Paper Published or Read Abroad by DMR Scientists

Antipyretic Activity of AeWa Herbal Formulation in Brewer's Yeast Induced Pyrexia in Rats

The aim of the present study was to investigate the antipyretic activity of AeWa herbal formulation by Brewer's yeast induced pyrexia in Wistar rats. AeWa herbal formulation consists of 13 medicinal plant parts and some of which are reputed for antipyretic effect. The acute oral toxicity was carried out in albino mice according to OECD 423-guidelines. It revealed that there is no toxic sign up to the dose level of 2000 mg/kg body weight. Adult albino rats of either sex (200-250 gm) were divided in to five groups containing six in each group for antipyretic study. Before yeast injection, the basal rectal temperature of rat was recorded and after that, the rats were given subcutaneous injection of 10 ml/kg of 15% yeast solution. Rectal temperature of each rat was again measured 19 hrs after yeast injection. Then, the test drugs and standard drug were administered orally into different groups. Three doses of test drug (1, 1.5 and 2 gm/kg body weight) were used. Paracetamol (150 mg/kg) was administered to standard group. Rectal temperatures were measured at 1, 2, 3, 4 and 5 hours after test drug administration. This herbal formulation (2 g/kg body weight) showed significant reduction of yeast induced pyrexia in rats at 1hr, 2hr, 3hr and 4hr after administration of test drug ($p<0.001$) when compared to the control group. The present results show that AeWa herbal formulation possesses a significant antipyretic effect in Brewer's yeast induced pyrexia in rats.

Reference: *Mu Mu Sein Myint, Khin Phyu Phyu, Khine Khine Lwin, et al.* Interntional Seminar & Exhibition on Phytopharmaceuticals: Emerging Challenges and Opportunities: JSS College of Pharmacy, Udhagamandalam (Ooty). The Nilgiris, Tamil Nadu, India, 11th-12th December, 2017. (Best Poster Award)

News about Medicine & Health

Cancer Vaccines and Immunotherapy

Cancer vaccines are not just a dream for the future: several FDA-approved vaccines are cancer prevention vaccines. The hepatitis B vaccine and the human papilloma virus (HPV) vaccines prevent infection with cancer-causing viruses. By preventing the viruses from infecting body cells, these vaccines block the process that might eventually result in runaway cancer cell growth and damage to the body. Viruses, however, do not cause most cancers. The challenge for researchers is to use the model of the immune response to viral infection of cells to develop vaccines for cancers not caused by viruses.

This idea is not so far fetched. Just as the immune system constantly works to protect the body from harmful viruses and bacteria, it also plays a vital role in protecting the body from cancer. Many cancerous cells express markers, called antigens, that act as targets for the immune system. In many cases, immune cells recognize the cancerous cells and destroy them. However, some cancerous cells are able to hide from the immune system or suppress it, or large numbers of cancerous cells simply overwhelm the immune system's ability to clear the cells. The cancer cells are then able to divide and spread unchecked, damaging tissues and organs as they do. Today's researchers are devising vaccines they hope will trigger the immune system to attack cancer cells reliably and effectively. They are also exploring other ways to boost the immune system's response to cancerous cells.

Therapeutic vaccines

The HPV and hepatitis B vaccines are preventive vaccines. That is, they work by preventing an infection that might lead to cancer. A therapeutic cancer vaccine, on the other hand, would be used to treat cancer after it has already appeared. There are two main types of such therapeutic vaccines: autologous vaccines and allogenic vaccines.

Autologous cancer vaccines Autologous means "derived from oneself" – so an autologous vaccine is a personalized vaccine made from an individual's own cells — either *cancer cells* or *immune system cells*.

To make an autologous *cancer cell* cancer vaccine, cells from a person's tumor are removed from the body and treated in a way that makes them a target for the immune system. They are then injected into the body, where immune cells recognize them, disable them, and then do the same to other cancer cells in the body. Ideally, memory immune cells would persist in the body and be able to respond if cancer cells returned. The goal may be to treat the cancer present in the body or to prevent tumors from recurring after more conventional cancer treatments like surgery, radiation, or chemotherapy, have eliminated most or all of the cancer.

Several Phase 2 and Phase 3 trials of such autologous cancer cell vaccines are in process or have been completed, though none has been licensed.

Another approach to autologous cancer vaccines is to use an individual's own immune cells to make the vaccine. The US FDA has licensed one autologous vaccine made from immune cells. Sipuleucel-t (Provenge®) is an autologous immune cell prostate cancer vaccine. It has been shown in clinical trials to extend life for men with treatment-resistant metastatic prostate cancer.

Sipuleucel-t is produced and works in the following manner:

1. Patient goes to lab to get blood drawn.
2. Lab isolates a certain type of immune cell from patient's blood.
3. Lab technicians expose the immune cells to a prostate-cancer antigen fused with an immune-cell stimulator.
4. Treated immune cells are infused back into the patient.
5. Treated immune cells signal other immune cells to attack prostate cancer cells.

Several Phase 2 and Phase 3 trials of other autologous cancer cell vaccines are in process or have been completed. For example, researchers at the University of Pennsylvania have developed an experimental breast cancer vaccine. This vaccine uses immune cells from patients who have a certain type of early breast cancer: immune cells are extracted and exposed to a tumor antigen and immune-cell stimulators and then injected back into the body.

The treated cells will then respond to cells expressing the target antigen. The strategy behind this particular vaccine is to use it in a very early stage of a certain type of breast cancer, before the body has become host to a very large population of cancer cells. The vaccine showed some promise in a Phase 1 trial: most of the vaccinated women had fewer cells expressing the tumor antigen after vaccine treatment than similar women who did not receive the vaccine. Study on this vaccine continues.

Allogenic cancer vaccines "Allo-" means *other*. Allogenic cancer vaccines are made from non-self cancer cells grown in a lab.

Several allogenic cancer cell vaccines have been tested and are being tested, including vaccines to treat pancreatic cancer, melanoma (skin cancer), leukemia, non-small cell lung cancer, and prostate cancer. Allogenic cancer vaccines are appealing because they are less costly to develop and produce than autologous vaccines. So far, none has been shown to be effective enough to be licensed. Several allogenic immune cell vaccines have been tested in very early stages as well.

Protein or peptide cancer vaccines

The autologous and allogenic vaccines discussed above are whole-cell vaccines: that is, they are made from entire cancer cells or immune system cells. But some cancer vaccines in development are made from parts of cancer cells. These parts are proteins from cells, or even smaller components called peptides, which are sections of proteins. These proteins and peptides can be delivered as a vaccine alone, coupled with carriers such as viruses, or in combination with immune-stimulating molecules. As with most of the other therapeutic cancer vaccines, these protein or peptide vaccines for cancer are still in clinical trials.

DNA vaccines

Another approach to therapeutic cancer vaccines uses DNA associated with tumor antigens to mount an immune response to an existing tumor. Generally, this involves vaccinating the cancer patient with a preparation containing DNA rings called plasmids. The plasmids, while not taken up into the patient's own cellular DNA, prompt body cells to produce key tumor antigens. Those antigens then signal immune cells to start responding to similar antigens on existing cancer cells in the body. Human trials of DNA vaccines to target many cancers, including breast cancer, HPV-related cancers, prostate cancer, and melanoma, are underway.

Other approaches

Vaccines that work in the ways described above are just one tool to harness the immune system to fight cancer. Other therapies, some used for cancer treatment for many years, work to enhance different parts of the immune system to mount specific responses to cancer-related antigens

BCG and bladder cancer BCG is a tuberculosis vaccine. It is made from live but weakened bacteria related to the ones that cause tuberculosis. BCG has been used for many decades as a treatment for early stage bladder cancer. BCG in solution is introduced into the bladder and left there for several hours. The patient voids the liquid after a time. Some of the bacteria remain in the bladder tissue and work as an immune system stimulant. They attract large numbers of infection-fighting cells to the bladder, where those cells also target the cancer cells.

Monoclonal Antibodies Antibodies are proteins that target antigens. They are produced in the body by immune system cells. Antibodies may mark an antigen for destruction, or they may prevent an antigen from attaching to a receptor on a body cell. Increasingly, technology is being used to generate monoclonal antibodies (MAbs)– "mono" meaning that they are a single type of antibody targeted at a particular antigen and "clonal" because they are produced from a single parent cell. Some mABs work by attaching to antigens on cancer cells and marking them for destruction by other immune system cells. Other mABs signal immune system cells to attack cancer cells. Others interrupt signals that tell cancer cells to divide. One of the most widely used mABs, trastuzumab (Herceptin®), works this way: these mABs attach to growth factors on a certain type of breast cancer cell and lead the cells to stop dividing and die. mABs may be linked to radioactive or chemical agents—these are then called conjugated mABs. The conjugated mAB helps deliver the radioactive or chemical agent to a targeted cancer cell so that it can be destroyed.

Cytokines

Cytokines are proteins secreted by immune system cells that play an important role in signaling to other immune system cells. For treatment of certain cancers, various cytokines are made in the lab. They are given to patients via injection into the skin or muscle, or into a vein. There are three types of cytokine therapies for cancer treatment:

- Interleukin boosts immune cell growth and division.
- Interferon can help immune system cells neutralize cancer cells and may suppress cancer cell growth.
- GMS (granulocyte-macrophage colony-stimulating factor) boosts immune cell production in the body. GMS may be used alone or given with other compounds.

Researchers must carefully evaluate which cancers are most suitable for a therapeutic vaccine approach. Generally, the cancers that are the best candidates are those whose treatments are associated with high costs and therapies that are less effective, or therapies that involve the risk of serious side effects for the patient. Cancers such as lung cancer, pancreatic cancer, and breast cancer are such candidates for vaccine therapy. Much study, insight, and skill will be needed to develop these vaccines.

Sources: https://www.historyofvaccines.org.
Contributed by Immunology Research Division

Improved Access and Targeted Mass Treatment Reduce Malaria Incidence in Myanmar

In difficult-to-reach areas of Myanmar, improving access to diagnosis and treatment and employing mass drug treatment for hotspots reduced malaria incidence. In four townships in eastern Myanmar, researchers conducted an observational study to assess providing early malaria diagnosis and treatment in all villages (population≈365,000) and mass drug treatment in high-incidence villages. With local community involvement, they established malaria rapid diagnostic testing at >1220 community-based posts and treated infected patients with artemether-lumefantrine plus a single, low dose of primaquine. Using ultrasensitive quantitative polymerase chain reaction surveys, they identified hotspot villages: those with malaria prevalence of ≥40% and at least 20% of positives being falciparum. Hotspot residents received dihydroartemisinin-piperaquine plus single-dose primaquine monthly for 3 months and were treated as needed for acute malaria.

Malaria caused 12% of febrile illnesses. Fifty hotspots (population>12,000) received mass drug administration. A median of 91% of these populations received at least one treatment round and 64% three rounds. In the 3 years during which malaria posts were established, falciparum incidence decreased by 60% to 98% in the townships. In hotspot villages, mass treatment was associated with a fivefold decrease in falciparum incidence. After 3 years, almost 80% of villages had been falciparum malaria–free for at least 6 months. Molecular markers for artemisinin resistance remained stable. With resistance to artemisinin and partner drugs increasing in the Greater Mekong region, the window for malaria elimination is closing.

This study showed that scaling up treatment and adding targeted mass treatment was successful in reducing falciparum malaria and interrupting transmission in four townships. Important questions remain. Can these interventions be scaled up? What is the duration of impact of mass treatment? An editorialist asks whether this approach would work in other areas and observes that hotspots can be transient and dependent on metrics used to define them. The authors note that malaria vector control in the Greater Mekong region is less effective than in many areas, making it especially dependent on antimalarial drugs. Landier J *et al*. Effect of generalised access to early diagnosis and treatment and targeted mass drug administration on *Plasmodium falciparum* malaria in Eastern Myanmar: An observational study of a regional elimination programme.

Sources: https://www.jwatch.org.
Contributed by Molecular Technology Applications Division

Scientists Improve DNA Transfer in Gene Therapy

Parkinson's disease, Huntington's disease, cystic fibrosis -- these and many other fatal hereditary human diseases are genetically transmitted. Many cancers and cardiovascular diseases are also caused by genetic defects. Gene therapy is a promising possibility for the treatment of these diseases. With the help of genetically modified viruses, DNA is introduced into cells in order to repair or replace defective genes. By using this method, scientists have discovered a quicker and more efficient treatment for the cells. For this purpose, the scientists changed the so-called HEK293 cell line that is used for the production of therapeutic viruses. The cells then produced a protein called CD9 in large quantities. In addition, they modified the viruses used for gene transfer in such a way that CD9 is integrated into their envelope membrane. These genetic manipulations resulted in a faster and more efficient infection of the target cells. The resulting higher transfer rate of DNA into the target cells promises new and improved gene therapy treatment. The ability of viruses to introduce their genetic material into the host cells is used as a tool in gene therapy. These "gene taxis" consist of modified viruses, the so-called viral vectors. They are equipped with fully functional genes to replace the defective disease-causing genes in the cells. However, the prerequisite for this is that the viruses recognize and infect the corresponding cells. This is the point where the research of the junior research group Medical RNA Biology at the German Primate Center comes in. At the moment, the infection rates, depending on the target cells, are often around 20 percent, which is not enough for certain therapies. To change that, the researchers looked at the production of the so-called exosomes to find out how to use this mechanism in order for the virus vectors to become more efficient. Exosomes are small membrane vesicles filled with proteins, RNA or other molecules. They are used for the transportation of cell components and for intercellular communication. Our hypothesis was that we could improve the production of viruses and their efficiency by boosting exosome production in the cells. In order to produce large quantities of the CD9 protein, Jens Gruber and his team genetically engineered the HEK293 cell lines that are used for the production of viral vectors. This protein is known for its function in cell movement, cell-cell contact, and membrane fusion. The assumption was that it could also play a role in exosome production. In addition, scientists incorporated the

CD9 protein into the envelope membrane of viral vectors. Firstly, in comparison to the untreated HEK293 cells, exosome production in the HEK293-CD9 cells increased significantly, which suggests a crucial role of the protein in exosome formation. Secondly, the incorporation of the CD9 protein in the viral membrane has significantly improved the transfer of DNA. This was observed in an increased number of infected target cells that carried the desired gene without the implementation of additional virus vectors.

The increased amount of CD9 in the virus resulted in a higher infection rate that amounted to approximately 80 percent. The protein appears to have a direct impact on exosome production and virus efficiency, which has previously not been described. The results of our study provide us with a better understanding of exosome formation as well as virus production in cells.

These findings can be used to make currently used virus-based gene therapies more efficient. In future, one might be able to completely abstain from using viruses and only use exosomes to transport genetic material into target cells.

Sources: https://www.sciencedaily.com.
Contributed by Virology Research Division

Recent Arrivals at Central Biomedical Library (http://www.dmrlibrary.org)

1. Circulation Journal. 2018 August; 82(8).
2. Clinical Management of Thyroid Disease. Philadelphia: Elsevier, 2014.
3. Imaging of Arthritis and Metabolic Bone Disease. Philadelphia: Elsevier, 2009.
4. Ministry of Social Welfare, Relief and Resettlement – Newsletter. 2018 June.
5. Schiff, Wendy J. Nutrition for Healthy Living. 4th ed. New York: McGraw-Hill, 2016.
6. Stephenson, Tammy J.; Schiff, Wendy J. Human Nutrition: Science for Healthy Living. New York: McGraw-Hill, 2016.
7. WHO Bulletin. 2018 July; 96(7).
8. World Health Statistics 2018: Monitoring Health for the SDGs, Sustainable Development Goals. Geneva: WHO, 2018.

(၄၇) ကြိမ်မြောက် မြန်မာနိုင်ငံကျန်းမာရေးဆိုင်ရာသုတေသနညီလာခံ
ဆေးသုတေသနဦးစီးဌာန

ကျန်းမာရေးနှင့်အားကစားဝန်ကြီးဌာနမှ ကြီးမှူးကျင်းပသည့် (၄၇) ကြိမ်မြောက် မြန်မာနိုင်ငံကျန်းမာရေးဆိုင်ရာသုတေသနညီလာခံကို ၂၀၁၉ ခုနှစ် ဇန်နဝါရီလ (၇) ရက်မှ (၁၁) ရက်အထိ ဆေးသုတေသနဦးစီးဌာန၊ အမှတ်(၅)၊ ဇီဝကလမ်း၊ ဒဂုံမြို့နယ်၊ ရန်ကုန်မြို့တွင် ကျင်းပရန် စီစဉ်ထားပါသည်။

ညီလာခံတွင် ကျန်းမာရေးသုတေသနစာတမ်းဖတ်ပွဲ၊ ကျန်းမာရေးသုတေသနပိုစတာပြပွဲနှင့် ကျန်းမာရေးပညာရပ်ဆိုင်ရာနှီးနှောဖလှယ်ပွဲနှင့် ဟောပြောပွဲများပါဝင်မည်ဖြစ်ရာ စိတ်ပါဝင်စားသူ ပြည်တွင်းပြည်ပမှ ပညာရှင်များအား ဖိတ်ခေါ်အပ်ပါသည်။ မှတ်ပုံတင်ခြင်းကို ညီလာခံ Website (https://www.myanmarhrc.com) တွင် ကြိုတင်ပြုလုပ်နိုင်ပါသည်။

ပြည်တွင်း၊ ပြည်ပNGO အဖွဲ့အစည်းများ၊ ဆေးဝါးကုမ္ပဏီများ၊ ဓာတ်ခွဲခန်းကိရိယာ၊ ဓာတုပစ္စည်းတင်သွင်းသည့်ကုမ္ပဏီများနှင့် ပြည်တွင်း၊ ပြည်ပပုဂ္ဂလိကဓာတ်ခွဲခန်းများ၊ ဆေးရုံများ၊ ဆေးခန်းများအားလည်း ဆေးပစ္စည်းကိရိယာပြခန်းများ၊ ပိုစတာပြခန်းများနှင့် ပညာရပ်ဆိုင်ရာဟောပြောပွဲများတွင် ပါဝင်ဆင်နွှဲနိုင်ပါရန် ဖိတ်ခေါ်ပါသည်။ ဆေးပစ္စည်းကိရိယာပြခန်းများ၊ ပိုစတာပြခန်းများအတွက် Email: info@dmr.gov.mm သို့ဆက်သွယ်နိုင်ပါသည်။

(၄၇) ကြိမ်မြောက်မြန်မာနိုင်ငံကျန်းမာရေးဆိုင်ရာသုတေသနညီလာခံကျင်းပရေးလုပ်ငန်းကော်မတီ
ဆေးသုတေသနဦးစီးဌာန
အမှတ်(၅)၊ ဇီဝကလမ်း၊ ဒဂုံမြို့နယ်၊ ၁၁၁၉၁၊ ရန်ကုန်မြို့။

သို့

ကျန်းမာရေးနှင့်အားကစားဝန်ကြီးဌာနမှဝန်ထမ်းများအားဖြန့်ဝေပေးပါရန်မေတ္တာရပ်ခံအပ်ပါသည်။