



THE UNIVERSITY OF TOLEDO
MEDICAL CENTER

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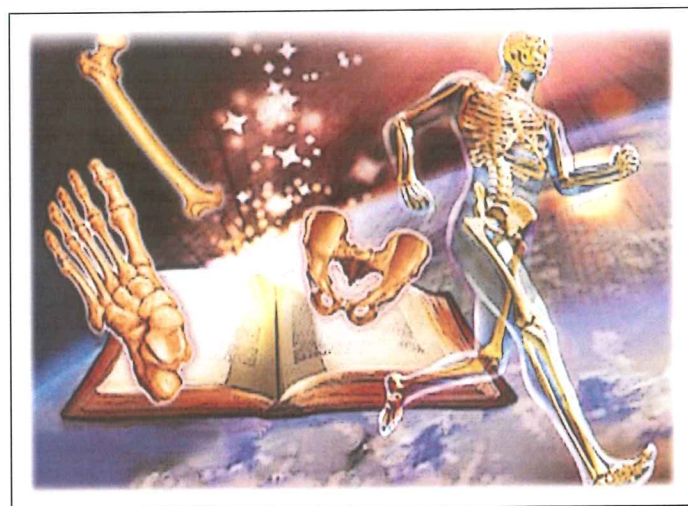
TO DOCTORS OF TOMORROW:

It Is Easy To Give Up, But Keep Pursuing Your Dreams

By: *Dr. Nabil Ebraheim, M.D.*

The road to becoming a medical doctor is a long and difficult one. Entering medical school and becoming a doctor in America is a dream that many people have, but the road is a very tough and trying one. Medical school has become one of the most competitive programs to enter – after four years of college, future doctors go to medical school for an additional four years and it is very hard to gain acceptance to medical school. The lengthy process takes eight years after high school to receive an M.D. title. The application process is expensive; students and families make tremendous sacrifices, a majority requiring loans to finance not only medical school but the application itself. Some students are forced to work and study for extended periods of time, all while maintaining excellent grades. With some of the best and brightest students applying for a limited number of available seats, it has become an extremely selective process. Some students enroll in higher education programs such as Master's Programs or Ph.D. Programs to gain more experience and recognition with the hopes that it will give them a competitive edge. Others work as volunteers in different capacities and for various organizations with the hope of gaining experience so the selection committee can see the good in them. The admissions committee will scrutinize applications for volunteer work, noting how often and the degree of continuity students work with various organizations. Certainly, this takes a driven and dedicated student to be able to accomplish the minimal feats required for medical school acceptance.

James Papadimos is an example of a strong medical school applicant who sought out opportunities to broaden his life experiences by enlisting as a volunteer at the Reception and Identification Camp of Vathy in Samos Greece. Here, he witnessed the suffering of over 4,000 refugees who fled from violence in their home countries; he used the skills he acquired during his MPH training to aid and advocate for all refugee camp members. One of the biggest challenges James encountered during this experience was a Hepatitis A outbreak due to the underfunded, resource-challenged state of the camp, lacking the simplest needs such as toilet paper. He played an active role on a team that designed and implemented an educational



program on hygiene and sanitation for the camp inhabitants. These efforts directly led to a decrease in disease transmission and improvement of living conditions. James demonstrated an ability to work with others to create a tangible solution to a public health crisis. This, along with his exposure to different cultures will enhance his capability to engage in meaningful patient interactions, ultimately improving patient care, which is why medical schools should seek out applicants like James with this kind of background. He recently learned valuable lessons, and he is ready to apply these skills when the opportunity arises. Ultimately, medical schools should seek out applicants like James with this kind of background to improve patient care.

After securing a seat in a medical school class and completing four years of challenging examinations, the journey is not over. Additional three to six years of residency training is required before becoming a practicing physician. The application process for residency programs is arguably as competitive as medical school depending on the medical specialty a student decides to pursue. Many specialties often require an additional year of fellowship training after residency.

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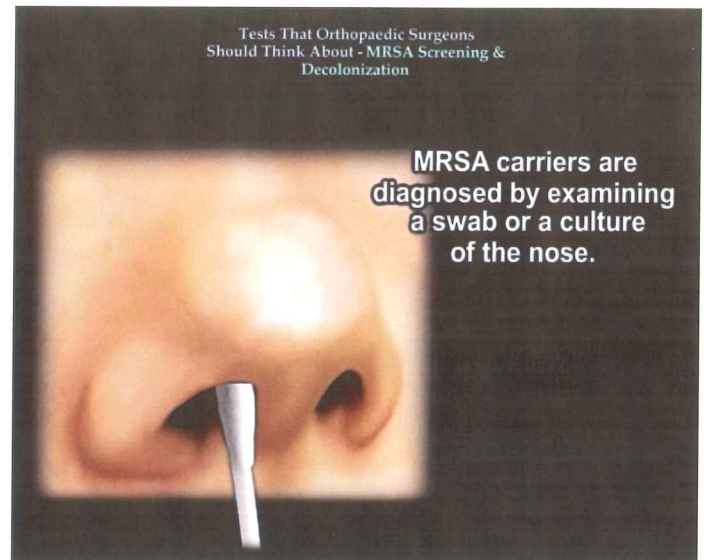
Despite this life-long commitment to learning, each year more and more students apply to the medical profession. As one of these prospective students, Mr. Papadimos will make a great addition to a medical school entering class given his dedication to helping others and his passion for healing. It is applicants with diverse backgrounds like his that make this field competitive, giving admissions committees a difficult time deciding where to make the cut. For

those young applicants like Mr. Papadimos who share this dream, take the long road one day at a time. It will be difficult, but the hardest thing is to not give up in the face of adversity. If you do not gain acceptance your first time applying, that does not mean you are not fit for medicine. Take a step back, re-evaluate, and seek out experiences as Mr. Papadimos has done to make the admissions committee see how valuable you are. You will get there!

MRSA Screening & Decolonization, Tests We Should Think About

Strategy for Prevention of Surgical Site Infection: optimization of the patient before surgery, make sure the patient is nutritionally fit, need to deal with patients who smoke, diabetic patients, overweight patients, need to improve the skin and soft tissue condition (area where the incision will be), try to reduce the bacterial burden that the patient is carrying, immediately before the surgery, you will give the patient prophylactic preoperative antibiotics and try to decrease the contamination in the operating room, the patient may bring the organisms on themselves to the operating room (about 80% of these organisms are brought by the patient), and do screening for Methicillin-Sensitive Staphylococcus Aureus (MSSA) or Methicillin-Resistant Staphylococcus Aureus (MRSA) and decolonization. If you identify these patients that are carriers and treat them before they go to the hospital, that will reduce the infection rate for these patients.

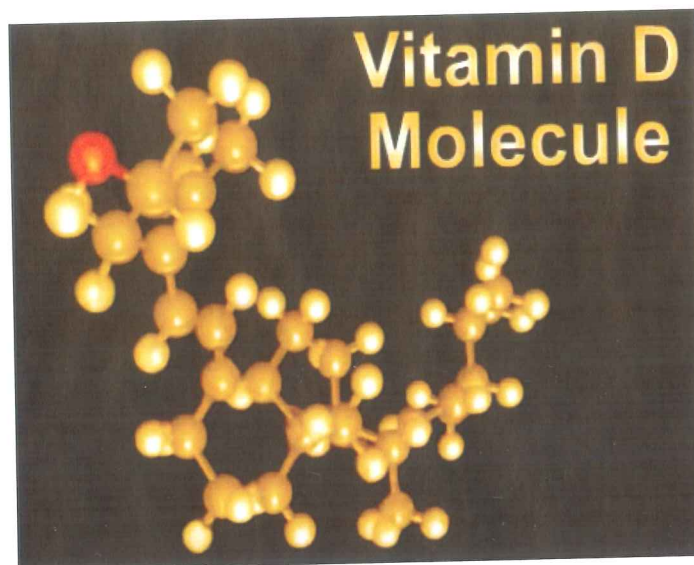
Once these patients (carriers) are in the hospital, it may be possible to then spread the bacteria they are carrying to other patients. Proper hand washing practices is very important to prevent the spread of bacteria. How can we decrease the bacterial burden of the patient bringing these organisms to the operating room? What are the tests that we should do? How can we help the situation when the patient is in the clinic or in the office? We should do screening for MSSA or MRSA and then do decolonization. Some patients have large reservoirs of bacteria (carriers) and these are the patients who will have an increased risk of surgical site infection, These reservoirs of bacteria are located in the nose, the axilla, the groin, and the perianal area. You want to identify these patients and eradicate the bacteria so that you can decrease the risk of surgical site infection. Being a MRSA carrier will increase the chances of infection (about 10x more risk for surgical site infection). You wouldn't know that a patient is a MRSA carrier unless you test them. It is important to identify these MRSA carriers so that we can give them the proper antibiotics, such as Vancomycin. A MRSA "carrier" is a person who can carry the bacteria without necessarily becoming ill. About 2% of the population are MRSA carriers. MRSA is a contagious bacteria that is difficult to treat because it is resistant to most commonly used antibiotics. What makes MRSA contagious? In the bacteria cell wall, there is a penicillin binding protein. When penicillin is able to bind to the binding protein of the cell wall, disruption of the cell wall and destruction of the bacteria is possible. However, if the staph aureus acquires the *mecA* gene, then it can alter the penicillin binding protein, making the bacteria resistant to all penicillins. People carry this MRSA harmlessly, and they do not even know that they are carrying it. The primary way of transmitting MRSA is through



direct contact from another person, an object that has it, or from sneeze droplets of an infected person. 30% of staph bacteria lives in the nose. About 25-30% of the population is colonized with *S. aureus*. This means that the bacteria are present, however it is not causing an infection with *S. aureus*. The odd ratio is 6 times if you are a MSSA carrier that you will get infection and 10 times if you are a MRSA carrier. MRSA carriers are diagnosed by examining a swab or a culture of the nose. You need to identify these patients before you bring them to the hospital and you want to eradicate the organisms or do decolonization by using 2%-4% chlorhexidine bath for 5 days. The patient should leave the chlorhexidine on the surface of the skin (It works better if kept on for a longer time), so it is better not to wash it off. Use 2% nasal mupirocin for 5 days (nasal antibiotic ointment). By the screening and the eradication program, you can drop the infection rate by about 40%-60% or more depending on the compliance of the patient. Our institution showed that empiric treatment is less costly than *S. aureus* screening and decolonization in total joint arthroplasty patients. Empiric treatment is less costly than Staphylococcus aureus screening and decolonization in total joint arthroplasty patients. They used preoperative empiric mupirocin treatment for all total joint arthroplasty patients. They find that the cost is much less than the cost of the standard screening and decolonization of the *S. aureus*. They found that the empiric treatment allows for more efficient workflow without compromising the patient.

25 Vitamin D, Tests We Should Think About

Vitamin D 25 is the most appropriate study to assess and monitor vitamin D status in the body. Vitamin D is important for proper maturation and development of bone. Vitamin D is also important in immunity and plays a role in other conditions. The main function of Vitamin D is absorption of the calcium and phosphate from the intestine. Vitamin D comes from diet, supplements, and exposure to the sun. Vitamin D is naturally found in fish. Exposure to the sun for 15 minutes will give a person about 10,000 units of Vitamin D. The average daily requirement of Vitamin D is approximately 400-800 International Units (IUs). Vitamin D gets activated metabolically in the liver and in the kidney. The activation occurs by hydroxylation. Hydroxylation to 25 Vitamin D3 occurs in the liver. The big organ takes the big number- 25, so 25(OH)-Vitamin D3. Another hydroxylation occurs in the kidneys. The small organ takes the small number-1. The result will be 1, 25 (OH)2- Vitamin D3. This is the active form of Vitamin D and works mainly on the intestines and bones. The activation of Vitamin D to 1, 25 hydroxyvitamin D is controlled by the parathyroid hormone. Any deficiency or any problem in the process of activating Vitamin D3 to its active form will lead to deficiency of Vitamin D in the body. Vitamin D deficiency is very common and the majority of people are not aware of it. In fact, Vitamin D deficiency symptoms are subtle and nonspecific. 25-hydroxyvitamin D has a long half-life and a higher concentration. This is probably easier to measure and obtain 25 hydroxyvitamin D than the active form, which is 1,25-dihydroxyvitamin D. The half-life of 25-hydroxyvitamin D is 2-3 weeks. The half-life of 1,25-dihydroxyvitamin D is only 4-6 hours. The circulating levels of 25- hydroxyvitamin D is 1000x more than 1,25 dihydroxyvitamin D. Therefore, 25-hydroxyvitamin D test is the best study to determine the Vitamin D deficiency in the body. A low level of 25- hydroxyvitamin D could mean that a person is not getting enough exposure to the sun, is not getting enough dietary Vitamin D, or there may be a problem with absorbing Vitamin D from the intestines. The patient may be taking Dilantin, which interferes with hydroxylation of Vitamin D in the liver. A low level of 1, 25-dihydroxyvitamin D usually indicates kidney disease. 40%



of the United States population have Vitamin D deficiency. Symptoms of Vitamin D deficiency may include fatigue and tiredness, not sleeping well, muscle weakness, bone pain, osteoporosis/ osteomalacia, or fractures. Elderly patients are vulnerable to Vitamin D deficiency because they usually live indoors or in nursing homes with no sun exposure or because these patients may not eat enough food containing Vitamin D or they may not receive enough supplements. Vitamin D deficiency may impair or affect wound healing. Vitamin D deficiency may cause bone loss and places the elderly patient at risk of fractures. Deficiency may cause slow healing of fractures or nonunion of the fractures. If you find a patient with fractures that are not healing well, or a patient with fractures due to inadequate bone mass (osteoporosis), this is the time to get a 25- hydroxyvitamin D blood test. The Endocrine Society defines Vitamin D deficiency as 25 Vitamin D level below 20 ng/mL, and insufficiency as the level between 21-29 ng/mL. In general, a 25 Vitamin D level greater than 30 ng/mL is probably adequate, but these numbers are controversial.

Smoking/Nicotine & Cotinine Level, Tests We Should Think About

Cotinine tests may be ordered for evaluation of the patient tobacco use status. Cotinine levels can be detected in either the blood, the urine, or saliva. Cotinine is found in tobacco and is the main metabolite of nicotine. Cotinine is the best biomarker for exposure to tobacco smoke. The level of cotinine in the blood is proportionate to the amount of exposure to tobacco smoke, which also includes exposure to secondary smoke. Cotinine levels less than or equal to 10ng/mL are consistent with no active smoking. Cotinine levels from 10-100 ng/mL signals light smoking. Cotinine levels above 300

ng/mL signals a heavy smoker (more than 20 cigarettes per day). The urine concentration of cotinine is 4-6 times more than in the blood or saliva, making the urine test more sensitive in detecting low concentration exposure. Active smokers may reach levels of 500 ng/mL in the urine. Smoking is harmful not only to the lungs and heart, but it is harmful to the bones and to the soft tissues, and can also cause cancer.

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Smoking decreases wound healing, and may cause surgical site infection and pneumonia after total hip or total knee replacement. Smoking is a risk factor for osteoporosis. Smokers are 3 times more likely to develop chronic back pain. There is a correlation between spine fusion and smoking. Smoking and other tobacco use play an important role in inhibiting bone healing with an increased risk of nonunion fractures, and psuedoarthrosis (nonfusion) in spine surgery. Psuedoarthrosis of the spine after spine fusion can be up to 5 times more in a smoker than in a nonsmoker. Nicotine causes vasoconstriction of the small vessels and decreases the blood flow to the area that is already compromised by the injury or by the surgery. In smokers, there is an increased risk of nonunion and decreased patient satisfaction after spine fusion. There is also an increased risk for recurrent herniation and reoperation following lumbar disc surgery. These risks are reduced if the patient quits smoking permanently. There is an increased incidence in smokers than nonsmokers. There is also a correlation between smoking and rotator cuff surgery. The results are better in nonsmokers. The patient will have less pain and a higher degree of function if they are a nonsmoker. Pain and loss of function is greater after rotator cuff surgery with smokers. Smoking in general, whether it is directly or passively, has a serious negative affect on the musculoskeletal system with increased pain in the neck, in the lower back, increased incidence of rotator cuff tears and shoulder dysfunction with less than satisfactory outcome after rotator cuff surgery. Smoking is probably the single most important factor in post-operative complications. The American Academy of Orthopaedic Surgeons (AAOS) is taking an active role in teaching and educating physicians about the risks associated with smoking. Smoking cessation before surgery appears to benefit the patients who are undergoing surgery. The longer the cessation of smoking, the better the result. The patient can reduce these risks by stopping smoking before surgery. The physician should engage with the patient and provide them with educational material about quitting smoking which is beneficial to the patient. Multidisciplinary team, biofeedback, and behavioral therapy are usually helpful. Obesity, diabetes, and smoking are very serious health hazards.

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Dr. Ebraheim, Amanda Critton and
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