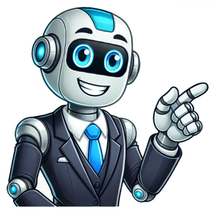
Continue



0 ratings0% found this document useful (0 votes)1K viewsAndrzej Moniuszko, Dharmesh Patel (auth.) - Nuclear Medicine Technology Study Guide_ A Technologists Review for Passing Board Exams-Springer-Verlag New York (2011)SaveSave Andrzej Moniuszko, Dharmesh Patel (auth.) - Nuclea... For Later0%0% found this document useful, undefined This is a fun estimate! Real aging varies. Enjoy comparing with your friend! Welcome to Luxwisp your friendly corner of the internet where curiosity isnt just welcomed, its celebrated. Here, we dive into a mix of fascinating facts, lively debates weighing pros and cons, and thought-provoking explorations of societys many quirks. Whether youre a fact fanatic, a debate enthusiast, or simply someone who loves to learn something new every day, youre in the right place. At Luxwisp, we dont believe in overstating things or drowning you in jargon. Instead, were all about sparking genuine conversation. Ever stumbled upon a piece of trivia that made you pause and think, How does that even work? or wondered why some ideas split opinions like a perfectly balanced seesaw? Thats what fuels our passion. We write the kind of articles that feel like a chat with an old friendone whos fascinated by the world and loves digging into all the little details that often go unnoticed. Our journey here started like many conversations dowith a simple question and a spark of curiosity. We realized that the topics shaping our world, from cultural shifts to everyday oddities, deserve more than a quick scroll-through. They deserve attention, analysis, and a touch of humor. Whether its the surprising science behind common myths, the pros and cons of unconventional ideas, or the intricate ways society molds our behaviors, we explore it all with an open mind and a friendly tone. What can you expect when you join us at Luxwisp? First off, a relaxed, conversational vibe that makes even the most complex topics feel accessible. We know that everyone has a unique way of absorbing informationso we break down big ideas into bite-sized pieces that are easy to digest without losing the context or excitement. Heres a little taste of what youll find: Fact Files That Fascinate: Ever wondered why some animals have peculiar features or why history often repeats itself? Our fact files delve into the "whys" and "hows" of everyday wonders, mixing science, history, and a bit of quirky charm. Balancing Act: Life isnt just black and white, and neither are the topics we cover. Our pros and cons sections give voice to both sides of an issue, encouraging you to consider different perspectives without feeling overwhelmed by bias. Society Under the Lens: Our communities are as complex as they are diverse, and each story, trend, or phenomenon is worth a closer look. From the evolution of social norms to the cultural phenomena that shape our lives, we bring you analyses that aim to deepen your understanding of how society ticks. Fun, Fresh Insights: Learning should be fun! We strive to inject humor and relatable anecdotes into our coveragethink of it as a friendly chat over coffee that leaves you both informed and entertained. We believe that understanding the world is a lifelong journey, and every interesting fact or balanced debate is a step toward a greater awareness. Were not here to push an agenda or hand out answers like candy; instead, were here to pose thoughtful questions, share what we know (and sometimes what were still figuring out), and invite you to join the conversation. Have you ever been surprised by how a seemingly small fact can open up a whole new perspective? Or experienced that aha! moment when a simple explanation unraveled a mystery that had puzzled you for ages? Thats the kind of experience we love engineering here at Luxwisp. Our articles are crafted to spark those momentsones that invite you to pause, reflect, and maybe even question the familiar. And it doesnt stop there. We also thrive on interaction. We know that every reader brings a unique set of experiences and insights, and were excited to hear your thoughts. While our space is filled with well-researched articles and candid discussions, its your reflections and opinions that add the real spark. Think of Luxwisp as a community where every comment adds another layer to the conversation, making our exploration of the world even richer. So, whether youre here to settle a debate with a friend, to get a fresh take on a familiar subject, or simply to enjoy a neat fact that lights up your day, Luxwisp is here for you. Grab your cup of coffee, settle into a comfy chair, and get ready to explore the fascinating labyrinth of facts, societal insights, and lively discussions that keep our world ever-changing. Thanks for visiting Luxwispwere thrilled to share our journey of discovery with you. Every fact we explore, every discussion we spark, and every article we write is part of an ongoing conversation about what makes our world tick. Join us, and lets keep the conversation going together! Healthy Living A review done in 11 studies to compare the improvement rates of CBT and other forms of therapy as treatments showed that CBT recorded a higher improvement rate in about 60 percent of the cases compared to the other alternative forms of therapy. Healthy Living Kidney stones are a common occurrence, but can be managed with some medications and dietary restrictions. Healthy Living Procrastination is something every person can do. Even a well-organized person does it. It is a bad, yet a hard habit to break. Have you been putting things off lately? Are your deadlines getting closer and closer, and yet you keep putting it off to do it later, and in the last minute, you feel the stress and pain to complete it? If you are a procrastinator, you have to read this article. There are some tips that you can try to overcome procrastination. Scroll down the page to learn these life-changing tips. Healthy Living Lyme disease does not have a proper and specific test available for its diagnosis. However, there are several blood tests that will help doctors come up with a Lyme disease diagnosis. Continue reading this article and learn all the possible ways that Lyme disease can be diagnosed. Healthy Living Generally physicians assess danger signs before prescribing treatment for a specific disease, and they may not prescribe any treatment if a patient has mild or no symptoms. However, doctors prescribe blood thinner drugs to atrial fibrillation patients for stroke prevention. Healthy Heart It is normal to feel tired and worn out for a day or two after undergoing the procedure. Other side effects such as chest discomfort and heart palpitations are also normal, and they will go away with time. Healthy Living There are a few cases where genetic mutations are the main cause of obesity. Spontaneous mutations occur in genes that deal with food intake and appetite control. Healthy Living Cholera is a contagious infection that affects mostly the intestines apart from other parts of the body. The infection is known to cause severe effects to its victims, and it has claimed the lives of thousands of people every year. Although the illness is dangerous and severe, somehow not many people are aware of it. Here are some facts and information you should know about cholera. Healthy Living The benign outcome of chickenpox treatment depends on the timely actions. All measures are directed on the mitigation of the main symptoms: fever, itchiness, headache, dehydration, and the prevention of any further complications. However, for immunocompromised kids there is an alternative way to treat chickenpox. Read this article to learn more. Diet and Nutrition Dehydration is when your body loses water more than the amount you take in. There are several causes for dehydration and it can range from mild to severe. The most effective treatment for dehydration is to replace lost fluids and lost electrolytes. The best approach to dehydration treatment depends on age, the severity of dehydration and its cause. In this article, we will look at causes and symptoms of dehydration and ways to prevent it. Healthy Living Cholecystectomy is a surgical procedure aimed at removing the gallbladder in case of complications. There are several risks accompanying this procedure. Healthy Living Back pain is one of the common ailments affecting people and many factors could cause this pain so it is difficult to get a proper diagnosis. In this article, we will look at techniques used to get an accurate diagnosis as well as some common issues patients encounter while trying to get a back pain diagnosis. Parenting Cholera and diarrhea are two health problems that go hand in hand. While diarrhea is a given symptom of a cholera infection, diarrhea may be caused by other things. Healthy Living Conventional treatment for testicular cancer makes a patient go through the rigors of surgery, chemotherapy and radiation treatment, all of which guarantee lifelong side effects that severely impact the quality of life. This is one of the main reasons why people are gravitating towards holistic medicine. Holistic healing succeeds in establishing a mind-body-soul connection that eludes the symptomatic treatment peculiar to conventional medicine. Women's Health If unusual cells are detected on the cervixs surface during a pap smear, cervical ablation is used to establish if the abnormal cells are signs for cancer. Healthy Living Psoriasis is characterized by the thick red patches that form on different areas of the skin. It seems to be hereditary in some cases, but the exact cause is not yet known. Read this article to learn more about the symptoms and aggravating factors of psoriasis. Healthy Living The body temperature changes all throughout the day. But if there is a significant increase in temperature, it is called a fever. In healthy adults, acute fever is unlikely to be the first indication of a chronic condition. Infections are the most common cause of fever in adults . Healthy Living The hepatitis B virus (HBV) is one of the most deadly viruses that can cause irreparable damage to the liver. Learning about the infection it causes can help you prevent it and treat it at the earliest. Diet and Nutrition Cholera is a dangerous infection that - upon development in the body of a human being - causes severe symptoms that can be fatal if not treated early and correctly. This infection is mostly characterized by watery diarrhea, which is the most common symptom of the infection. Continue reading to learn more about the treatment of cholera. Healthy Heart Having a catheter ablation is a better option compared to other medication options, such as anticoagulants and antiarrhythmic drugs. The procedure saves you the trouble of having to take drugs for the rest of your life to keep the heart complications in check. Women's Health If symptoms of bacterial vaginosis are present during pregnancy, metronidazole tablets are taken for five days or as prescribed by the physician. Metronidazole is the preferred antibiotic as it is the most effective treatment of bacterial vaginosis. Continue reading this article to know some of the vaginitis treatments available. Healthy Living Do you have back problems? Have you heard about spinal stenosis surgery? Are you wondering if this surgery is an option for you? Read about the reasons why you need spinal stenosis surgery. Healthy Living Red rashes on your head are the major characteristics of scalp psoriasis. Read this article to learn more about it. Beauty and Anti Aging Diet and healthy skin go hand in hand to a large extent. Here are some foods that you should incorporate in your everyday diet to promote healthy and glowing skin. Authors: Eleanor Mantel 0, Janet S. Reddin 1, Gang Cheng 2, Abass Alavi 3 Prepares students and technologists for registry examinations in nuclear medicine technology Provides practice questions and answers with detailed explanations, as well as a mock registry exam Expanded coverage of hybrid multimodality imaging, and other new procedures and practices This textbook now published in its 6th edition prepares students and technologists for registry examinations in nuclear medicine technology by providing practice questions and answers with detailed explanations, as well as a mock registry exam. The questions are designed to test the basic knowledge required of nuclear medicine technologists, as well as the practical application of that knowledge. The topics covered closely follow the content specifications and the components of preparedness as published by the certification boards. This new edition now includes new tracers for diagnostic imaging and therapeutic applications as well as other newly approved procedures. Coverage of positron emission tomography and hybrid multimodality imaging in the field of nuclear medicine and molecular imaging has also been expanded. Eleanor Mantel, University of Pennsylvania, Nuclear Medicine and Molecular Imaging,Philadelphia, PA, USAJanet S. Reddin, University of Pennsylvania, Radiology and Nuclear Medicine, Philadelphia, PA, USAGang Cheng, Philadelphia VA Medical Center, Radiology, Philadelphia, USA, PA, USAAbass Alavi, University of Pennsylvania, Radiology and Nuclear Medicine,Philadelphia, PA, USA It looks like you're offline. 3-72Info:3-720 Single-Photon-Emissionscomputertomographie des Gehirns 3-721 Single-Photon-Emissionscomputertomographie des Herzens 3-722 Single-Photon-Emissionscomputertomographie der Lunge 3-724 Teilkrper-Single-Photon-Emissionscomputertomographie ergnzend zur planaren Szintigraphie 3-72x Andere Single-Photon-Emissionscomputertomographie Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. MeSH Heading Nuclear Medicine Tree Number(s) H02.403.740.500 Unique IDD009683 RDF Unique Identifier Scope NoteA specialty field of radiology concerned with diagnostic, therapeutic, and investigative use of radioactive compounds. Entry VersionNUCLEAR MED Entry Term(s) Atomic Medicine Medicine, Atomic Medicine, Nuclear Nuclear Radiology Radiology, Nuclear Previous Indexing Nuclear Energy (1966) Nuclear Warfare (1966) Radiation Injuries (1966) Radioisotopes (1966) See Also Radioisotopes Public MeSH Note67 History Note67 Date Established 1967/01/01 Date of Entry 1999/01/01 Revision Date 2016/03/02 Nuclear Medicine Preferred Concept UIM0015036 Scope NoteA specialty field of radiology concerned with diagnostic, therapeutic, and investigative use of radioactive compounds. Terms Nuclear Medicine Preferred Term Term UI T028800 Date01/01/1999 LexicalTag NON ThesaurusID NLM (1967) Atomic Medicine Term UI T028798 Date03/30/1974 LexicalTag NON ThesaurusID UNK (19XX) Medicine, Nuclear Term UI T028799 Date12/04/1989 LexicalTag NON ThesaurusID NLM (1991) Medicine, Atomic Term UI T028797 Date12/04/1989 LexicalTag NON ThesaurusID NLM (1991) 8-53Info:8-530 Therapie mit offenen Radionukliden 8-531 Radiojodtherapie 8-539 Andere nuklearmedizinische Therapie Ask the publishers to restore access to 500,000+ books. What Is a Nuclear Medicine Physician?Nuclear medicine uses radioactive tracer medications, called radiopharmaceuticals, along with medical imaging techniques, to produce images that show how an organ in the human body is functioning. Nuclear medicine can be used for research, diagnosis, or treatment of disease (The American Board of Nuclear Medicine). A specialist in nuclear medicine is called a nuclear medicine physician. To view this video please enable JavaScript, and consider upgrading to a web browser that supports HTML5 videoIt is important to distinguish between general radiology and nuclear medicine. Radiology also uses medical imaging techniques to image the body, but these images show the anatomic structure (as opposed to the functioning) of organs in the body to help diagnose and treat illness and injury. Some examples of imaging techniques used by general radiologists (specialists in this field) include x-ray, MRI, or CT scan (UCSF Department of Radiology and Biomedical Imaging).Nuclear medicine was officially recognized as its own medical specialty in 1971 with the subsequent establishment of the American Board of Nuclear Medicine (ABNM). The ABNM establishes requirements for acquiring and maintaining board certification in nuclear medicine in the United States. To be designated as board certified, a physician must complete a one-year internship and three years of nuclear medicine training after finishing medical school. If the physician is already a board certified radiologist, they must complete an additional 16 months of training in nuclear medicine. They must then pass an exam. Maintaining the board certification requires completion of continuing medical education hours yearly (The American Board of Nuclear Medicine).History of Nuclear MedicineHenri Becquerel (1852-1908)The history of nuclear medicine starts with the serendipitous discovery of radioactivity in 1896 by Henri Becquerel, a French physicist. Becquerel noticed that uranium emitted a radiation that could be seen on a photographic plate. Thinking this was explained by the then newly discovered x-rays, he ran further experiments and discovered that the new rays differed in their electric and magnetic properties from x-rays. For this discovery, he shared the 1903 Nobel Prize in Physics with Pierre and Marie Curie, who named the new ray radioactivity. (Nobel Prize website)Georg Charles de Hevesy (1885-1966)The father of nuclear medicine is Georg de Hevesy, a Hungarian chemist who in 1923 injected a solution containing a radioactive isotope of lead into a horse-bean plant to watch its uptake in the roots, stem, leaves, and fruit. He later did a similar experiment with a rabbit, watching its circulation by the movement of the isotope. De Hevesy even experimented on himself, when he and a fellow chemist drank some radioactive water then measured its concentration in their urine. Using this data, they determined the average time a water molecule stayed in their bodies was 13 1.5 days (Myers,1979).The use of a radioactive isotope to image parts of the body became known as the Tracer Principle. This is the principle on which modern nuclear medicine is built. De Hevesy received the 1943 Nobel Prize in Chemistry for his work (Myers, 1979). He also received The Atoms for Peace Award in 1959, a prize given for peaceful application of the principles of atomic energy (MIT) and numerous honorary degrees (Myers, 1979).Ernest Lawrence (1901-1958)Ernest Lawrence was an American nuclear physicist who invented the cyclotron, a machine which can produce radioactive isotopes. The idea came from a diagram he found in a German physics periodical. He sketched a prototype on a napkin and then built the machine, which was small enough to fit in one hand. Once proven successful, he built larger prototypes in his lab at University of California at Berkley.He won the 1939 Nobel Prize in Physics for his invention. The cyclotrons ability to easily produce radioactive isotopes made the acquisition of these materials much easier for others who wished to use them for further experiments, such as his brother (see below) (Science and Technology Review).John H. Lawrence (1903-1991)John H. Lawrence was an American physician and also the brother of Ernest Lawrence, the inventor of the cyclotron. John Lawrence administered radioactive phosphorus to humans with leukemia and cured the disease. He was the first to use radioactive material in treating human disease (Journal of Nuclear Medicine). This method eventually became common treatment for the blood disorder polycythemia vera, a disorder that occurs when a patient has too many red blood cells in their bodies. His most famous patient with polycythemia was the Cardinal Aloysius Stepinac. For this, Dr. Lawrence received a medal from the Pope. Dr. Lawrence also used radioactive labels on blood cells to measure their life span, and even made trips to the Andes Mountains in South America to study the effects of elevation on red blood cells (Budinger, Mel, Todias, 1991).Emilio Segr (1905-1989)Emilio Segre was a Jewish Italian physicist who, along with colleague Carlo Perrier, discovered the element technetium, number 43 on the periodic table. This element had not been discovered before because all of its isotopes are radioactively unstable, so the element had not previously been seen in nature on earth (Jackson, 2002). Later investigations of rock samples in Gabon, Africa have shown traces of technetium (Scerri, 2009). Advances in emission technology have shown that technetium may be present in some stars, particularly red giants. It is theorized that the stars actually produce the element (Scerri, 2009).Segre and another colleague then discovered an isotope of technetium using Ernest Lawrences cyclotron, technetium-99m, which is the most commonly used radioactive isotope in nuclear medicine today. This particular isotope is useful in medicine because of its short half-life of six hours, which exposes the patient to minimal radiation, but allows enough time for measurement of its emission and for completion of imaging (Scerri, 2009).Samuel Seidlin, MD (1895-1955)Dr. Seidlin was an endocrinologist (specialist in diseases of the endocrine system, including diseases of the thyroid) best known for his 1943 treatment of a patient with metastatic thyroid cancer at Albert Einstein School of Medicines Montefiore Hospital in New York. The patient, termed B.B. in the medical literature, had had his thyroid completely removed due to thyroid cancer several years prior to his admission to Montefiore. Though he didnt have a thyroid, B.B. exhibited all the signs of too much thyroid hormone in the body. Dr. Seidlin and his colleagues gave a tracer dose of radioactive iodine to the patient, then used a Geiger counter to determine whether the metastases showed evidence of uptake. They discovered that the metastases were, in fact, producing thyroid hormones and that there was no residual tissue from the actual thyroid left (the previous thyroid resection was successful). Therapeutic doses of radioactive iodine were administered to the patient from May to October 1943 with the result that he was effectively cured of metastatic thyroid cancer. The patient returned to normal and lived another nine years (Seidlin, 1946).The celebrated B.B. eventually published his story in Life magazine in 1949, with pictures of him before and after treatment. There was a marked difference in the pictures, demonstrating just how ill he had been prior to Dr. Seidlins therapy (Siegel, 1999). This marked the first time a radioactive medication had been used to treat metastatic cancer successfully.Benedict Cassen (1902-1972)Benedict Cassen was the inventor of the rectilinear scanner in 1950, the first device that created images of radioactivity. The scanner used a motor to move back and forth then print images via a connection to a printer. The first model was primarily used for thyroid imaging and took one to two hours for a complete scan. Eventually, the instrument was modified for use in several body organs. The rectilinear scanner was in wide use until computed axial tomography (CT) scans were invented in the 1970s. For his invention, Cassen is considered the Father of Clinical Nuclear Medicine (Blahd, 1996).Hal Anger (1920-2005)Hal Anger was an American nuclear physicist who is best known for his invention of the Anger gamma camera in 1952. In contrast to Cassens rectilinear scanner, this camera was able to take a complete picture of a human organ, though it took over an hour to do so. Anger continued to refine the camera until it was able to take an image of radioactive tracer distribution throughout the body in much less time and demonstrated the new version to the scientific community in 1958. In 1962, Alexander Gottschalk, MD came to Angers laboratory to find medical applications for the new device. Dr. Gottschalk demonstrated the usefulness of the device for localizing brain tumors and showing blood flow through the heart (Tapscott, 2005).The Anger gamma camera was the forbearer to modern PET and SPECT technology.Allan MacLeod Cormack (1924-1998) and Godfrey Newbold Hounsfield (1919-2004)Cormack was a South African theoretical physicist who invented computed axial tomography (CT). He designed the first successful prototype in 1963. Hounsfield was a British engineer who also built a CT scanner independent of Cormacks research. Hounsfield took the idea a step further into the potential applications of the machine. He eventually scanned the first human brain in 1971 in a female patient suspected of having a brain tumor. The scan showed a brain cyst. The CT scanner became a commercial success and is now widely used in medicine today. Cormack and Hounsfield shared the Nobel Peace Prize in Physiology and Medicine in 1979 for their invention. Interestingly, they had never met prior to the acceptance ceremony for the prize (Cierniak, 2011).Edward Joseph Hoffman (1942-2004) and Michael E. Phelps (1939-present)Edward Hoffman was a nuclear chemist who, along with Michael E. Phelps and others, invented the PET scanner in 1975 at Washington University School of Medicine. A year later, the team published a paper on using the PET on the full human body. This was followed by a series of papers showing the physical principles behind PET scanning (Cherry, 2004). Michael E. Phelps helped obtain FDA approval for use of the PET and reimbursement from insurance companies, making the test more widely obtainable. Phelps started the first clinical PET center, located at UCLA. He continues to perform research and teach medical professionals how to use PET there (Society of Nuclear Medicine).Diagnostic Nuclear Medicine TestsPositron emission tomography (PET)This scan uses a radiotracer that shows areas of high metabolism or high chemical activity in the body which are then picked up by the PET scanner. Areas of higher than normal metabolism are suspicious for cancer or other abnormalities. A PET is often used to stage newly diagnosed cancer (help determine whether the cancer is only in one place or whether it may have spread) or to determine whether theres been a recurrence of previously treated cancer (Society of Nuclear Medicine and Molecular Imaging). PET scans of the brain can be used to help diagnose various brain disorders such as seizures, dementia, and Parkinsons disease, and to determine how the brain is functioning after trauma (Johns Hopkins Medicine). PET scans of the heart can help determine how much blood is getting to the heart after a procedure to improve blood flow (Johns Hopkins Medicine).Single-photon emission computerized tomography (SPECT)This scan also uses a radiotracer to show function of areas of the body. The difference between SPECT and PET is in the type of radiotracers used and the type of radiation they emit. SPECT is useful for imaging of the brain, heart, and bones (National Institute of Biomedical Imaging and Bioengineering, 2016).PET/CTThis scan combines the advantages of a CT (seeing anatomy clearly) with the advantages of a PET (seeing how the organs function) into one scan, giving doctors more information in one image. The combination of the two solved the problem many doctors had with PET alone: it was difficult to determine exactly where in the anatomy areas of increased uptake were. Combining the two allowed for more precision in planning treatment (Society of Nuclear Medicine and Molecular Imaging).SPECT/CTThis scan combines the advantages of CT and SPECT imaging, in much the same way as a PET/CT does.CholescintigraphyAlso commonly called a HIDA scan, this is an imaging technique to watch how the gallbladder and bile ducts work. A radioactive tracer is injected into the arm of the patient. This is taken up by bile producing cells in the liver and travels with the bile through the gallbladder and bile ducts to the small intestine. A camera follows the progress of the tracer. This test is used to diagnose problems with the gallbladder and bile ducts (Mayo Clinic).Bone scintigraphyAlso commonly called a bone scan, this is an imaging test specific to the skeleton. It may be used to look for fractures not easily visible on an x-ray, to help diagnose the cause of bone pain, to look for infections in the bone (called osteomyelitis), and to look for spread of cancer to the bones (Johns Hopkins).Gastric emptying scan (GES)This scan allows doctors to watch food as it moves through the digestive system and is primarily used in diagnosing motility disorders. Motility disorders occur when food either moves too quickly or too slowly through the digestive system. The day of the test, the patient is given a small meal to eat with radioactive tracers in it. The test occurs in several stages to accurately observe movement of the radioactive meal. It lasts about four hours from start to finish (University of Washington Medicine, 2017).Stress/Rest Myocardial Perfusion ImagingAlso called a nuclear stress test, this test uses PET or SPECT technology to show which areas of the heart are receiving blood flow before and after exercise. This test may be ordered to make the diagnosis of heart disease, to determine how much of the heart was damaged in a recent heart attack, to see whether a patient is a good candidate for bypass surgery, or to understand how well recent treatment for heart disease is working. For the exercise portion, the patient will walk or run on a treadmill to increase the heart rate. For patients who are unable to exercise, a medication will be given to elevate the heart rate artificially. This test is usually ordered for patients with moderate to high risk of heart disease (Society of Nuclear Medicine and Molecular Imaging).Pulmonary Ventilation/Perfusion (V/Q) ScanThis scan measures airflow and blood flow to the lungs and is used primarily to diagnose or rule out pulmonary embolus, a blood clot in the lungs. It may also be used prior to some surgeries. The V/Q scan is unique in that it uses radiotracers both injected into the arm and breathed in through a mask (National Heart, Lung, and Blood Institute, 2016).Diseases Treated Using Nuclear MedicineHyperthyroidismHyperthyroidism is when the thyroid gland (a gland located in the neck) makes too much thyroid hormone. This causes accelerated metabolism in the body. Radioactive iodine (I-131) is a nuclear medicine therapy used to treat hyperthyroidism by destroying the overactive thyroid gland. It is administered in pill or liquid form and should not be given to pregnant or breastfeeding women. After the thyroid is destroyed, the patient will be given thyroid hormone in pill form to mimic a correctly functioning thyroid gland.After receiving treatment, patients will be given guidelines to follow to reduce radiation exposure risk to others for the first week following treatment. Any extra radiation not used by the thyroid stays in the body for a few days following treatment and is mostly eliminated via urine. Small amounts may be eliminated in saliva, sweat, and bowel movements. Patients may set off radiation monitors at airports, border crossings, or other areas for three months after treatment (Society of Nuclear Medicine and Molecular Imaging).Thyroid CancerRadioactive iodine therapy may also be used for patients with thyroid cancer. Patients will typically undergo surgery to remove the diseased thyroid prior to initiation of radioactive iodine therapy. The purpose of the radioactive iodine therapy is to make sure that all cancer cells are gone. Post treatment guidelines are similar to those of hyperthyroidism above (Society of Nuclear Medicine and Molecular Imaging).Non-Hodgkin lymphomaIbritumomab tiuxetan was the first FDA approved radioimmunotherapy approach to treatment for treatment of certain types of non-Hodgkin lymphoma. This medication combines a monoclonal antibody with a radioactive particle to target cancer cells and deliver radiation. A monoclonal antibody is a laboratory designed protein which mimics a part of the bodys own immune system, called an antibody. Antibodies identify and destroy invaders, such as bacteria or viruses. The monoclonal antibody is designed to identify cancer cells and then alert the bodys immune system to destroy them. The addition of a radioactive medication allows for delivery of radiation directly to the cancer cell (Gordon, 2008).Metastases to bones from prostate cancerThere are several targeted radionuclide therapies that help relieve pain and treat prostate cancer that has spread to the bone. These are a combination of a radioactive medication (or radionuclide) and a molecule that targets the cancer cells specifically. All are delivered in an injectable format and are designed to treat pain and help prevent fractures of bones that have metastatic lesions in them (Society of Nuclear Medicine and Molecular Imaging).Current Research Being Done using Nuclear MedicinePeptide Receptor Radionuclide TherapyPeptide receptor radionuclide therapy (PRRT) is a molecular therapy that is currently in Stage III trails within the United States and the European Union. This type of therapy targets neuroendocrine carcinomas. PRRT combines a laboratory created version of a hormone which these types of tumors bind to with a radioactive medication which kills cancer cells. This allows a high dose of radiation to be delivered directly to the tumor cells with minimal harm to healthy cells, thus reducing the severity of side effects (often less than those of chemotherapy). PRRT is injected intravenously, along with some amino acids designed to protect the kidneys from effects of radiation.PRRT offers a personalized approach to cancer treatment because it can be tailored to the characteristics of the specific tumor being targeted. It is designed to help control advanced neuroendocrine tumors (provide symptom relief, control spread of the tumor), but not cure them.PRRT is being studied for use in certain types of lung cancer, pancreatic cancer, pheochromocytoma (rare cancer of the adrenals), carcinoids, and neuroendocrine tumors of the gastrointestinal tract. It is considered a second or third line therapy after other therapeutic options (e.g., surgery) have been exhausted or been deemed infeasible.The current goal for research is to get this type of medication approved by the FDA. Future researchers plan to look at using more than one type of radiation therapy at the same time, other diseases this same concept could be used for, as well as other ways of delivering the medication (Society of Nuclear Medicine and Molecular Imaging).TheranosticsThis is an emerging field in the study of prostate cancer where radiotracers used in imaging are paired to a radionuclide agent to destroy cancer. Because of the radiotracer part, imaging can be performed to determine the effectiveness of the therapeutic part of the treatment. As new proteins, tumor pathways, and tumor characteristics are being discovered, research is being performed to determine whether these can be targets for future therapy (Society of Nuclear Medicine and Molecular Imaging).Development of New TracersMany patients require implantation of medical devices (for example, pacemakers of the heart, or artificial knees). There is an inherent risk of bacterial infection with the use of these devices which is often not caught until it has become advanced and more difficult to treat. There is a study looking for new type of radiotracers that bacteria cells take up but human cells do not. Using PET technology to see the tracers, this would allow doctors to see infections much earlier when they are easier to treat. If successful, these tracers could be used in other types of infections as well, not just those associated with implantation of medical devices (National Institute of Biomedical Imaging and Bioengineering).The research being done and the advances in ways nuclear medicine can help diagnose and treat illness is growing by leaps and bounds. Nuclear medicine remains an important part of modern medicine as a whole.ReferencesABNM. (n.d.). Retrieved August 31, 2017, from Scan. (n.d.). Retrieved September 05, 2017, from P07663Budinger, Mel, & Tobias. (n.d.). John Hundale Lawrence, 1991. Retrieved September 06, 2017, from R. (2011). Spiral Tomography. X-Ray Computed Tomography in Biomedical Engineering, 149-231. doi:10.1007/978-0-85729-027-4_7Distinguished Nuclear Pioneer1970 John Hundale Lawrence, M. D. (1970). J Nucl Med,11, 292-293.Fact Sheet: Guidelines for Patients Receiving Radioiodine I-131 Treatment. (n.d.). Retrieved September 04, 2017, from Sheet: Molecular Imaging and Cancer. (n.d.). Retrieved September 4, 2017, from Sheet: What Is Peptide Receptor Radionuclide Therapy (PRRT)? (n.d.). Retrieved September 04, 2017, from L. I. (2008). Zevalin. Getting the Facts. Retrieved September 4, 2017, from 7B0363CDD6-51B5-427B-BE48-E6AF871ACEC9%7D/ZEVALIN.PDFHenri Becquerel - Biographical. (n.d.). Retrieved September 3, 2017, from scan. (2017, August 15). Retrieved September 04, 2017, from of Nuclear Medicine - Leonard M. Freeman, MD. (n.d.). Retrieved August 31, 2017, from Radiotherapy. (n.d.). Retrieved September 04, 2017, from J. D. (n.d.). Emilio Segre Biographical Memoir, 2002, . Retrieved September 03, 2017, from VQ Scan. (2016, December 09). Retrieved September 05, 2017, from Emptying Scan. Retrieved September 05, 2017, from W. G. (1979). Georg Charles de Hevesy: the father of nuclear medicine. J Nucl Med,20(6), 590-594.News and Articles on Science and Technology. (n.d.). Retrieved September 06, 2017, from Medicine. (2017, January 10). Retrieved August 31, 2017, from Medicine. (2017, February 02). Retrieved September 07, 2017, from M. (2004). In Tribute of Edward J. Hoffman, PhD (1942?2004). Molecular Imaging & Biology,6(5), 271-274. doi:10.1016/j.mibio.2004.07.001Positron Emission Tomography (PET Scan). Johns Hopkins Medicine Health. . (n.d.). Retrieved September 5, 2017, from P07654Remembering E.O. Lawrence. (n.d.). Retrieved August 31, 2017, from E. (2009). Tales of technetium. Nature Chemistry,1(4), 332-332. doi:10.1038/nchem.271Seidlin, S. M., Marinelli, L. D., & Oshrey, E. (1946). Radioactive Iodine Therapy: Effect on Functioning Metastases of Adenocarcinoma of the Thyroid. JAMA,132(14), 838-847.Siegel, E. (1999). The Beginnings of Radioiodine Therapy of Metastatic Thyroid Carcinoma: A Memoir of Samuel M. Seidlin, M. D. (1895-1955) and His Celebrated Patient. Cancer Biotherapy & Radiopharmaceuticals,14(2), 71-79. doi:10.1089/cbr.1999.14.71Stress/Rest Myocardial Perfusion Imaging (MPI). (n.d.). Retrieved September 05, 2017, from M. J. (n.d.). Milestones in Thyroid Research at Einstein and Montefiore: 1920-2011. Retrieved September 2, 2017, from E. (2005). Nuclear Medicine Pioneer, Hal O. Anger, 1920-2005. J. Nucl. Med. Technol,33, 250-253.This detailed overview of nuclear medicine technology covers patient care, instrumentation, radiopharmaceuticals, federal regulations, imaging of ten systems within the body, and radionuclide therapy-complemented by hundreds of self-evaluation questions and answers mirroring the structure of national certification examinations. 3-70Info:3-700 Szintigraphie von Gehirn und Liquorrumen 3-701 Szintigraphie der Schilddrse 3-702 Szintigraphie anderer endokriner Organe 3-703 Szintigraphie der Lunge 3-704 Radionuklidventrikulographie des Herzens 3-705 Szintigraphie des Muskel-Skelett-Systems 3-706 Szintigraphie der Nieren 3-707 Szintigraphie des Gastrointestinaltraktes 3-708 Szintigraphie der Blutgefe 3-709 Szintigraphie des Lymphsystems 3-70a Szintigraphie des hmatopoetischen Systems 3-70b Resorptions- und Exkretionstests mit Radionukliden 3-70c Ganzkrper-Szintigraphie zur Lokalisationsdiagnostik 3-70d Teilkrper-Szintigraphie zur Lokalisationsdiagnostik 3-70x Andere Szintigraphien

**Steves review of nuclear medicine technology pdf. Review of nuclear medicine technology 5th edition pdf free download. Nuclear medicine technology study guide pdf. Review of nuclear medicine technology 5th edition pdf. Use of nuclear technology in medicine. Nuclear medicine review book. Nuclear medicine technology book. Pros and cons of nuclear medicine. Nuclear medicine review. Review of nuclear medicine technology 5th edition.**