e-Perspectives

on the Medical Transcription Profession

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Contents

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A Moving Target

Staying abreast of cutting-edge technology in medicine is difficult because it's a moving target even with all the resources at our fingertips these days—powerful computers, high-speed Internet connections, fast search engines, and ready access to the newest pharmaceuticals and latest surgical innovations and medical and diagnostic procedures in thousands of the finest medical journals in the world.

Case in point. Tell me quick: how many *nano-* words do you know? I'm not counting "nanosecond," as in the catchy "I'd do it in a nanosecond" which has largely replaced "I'd do it in a New York minute." Consider some of the new words and phrases from "Nothing Could Be Finer: Nanotechnology in Medicine," Dr. John Dirckx's feature article in this issue. To list just a few terms I noted: nanoart, nanobots, nanodevices, nanoengineers, nanofilter, nanogram, nanolithography, nanomachines, nanomaterials, nanomedical, nanomedicine, nanometer, nanomole, nanomotors, nanonephrology, nanoparticles, nanopores, nanorobotics, nanorobots, nanoscale, nanoshells, nanosieve, nanostructures, nanotechnicians, nanotube, nanotubules, and nanotweezers. Of course, not all new terms in nanotechnology begin with *nano-*, and the quick-reference list of nanotechnology terms included in "What's New in Medicine" includes other new terms used in nanotechnology in medicine culled from Dr. Dirckx's article.

HPI editors do research for a living, and how difficult is it for us to hit the moving target of new terminology in cutting-edge technology? It's a challenge, but knowing *how to do research* is surely the first step to success. Georgia Green's "The Best Things in Life Are Free: How to Use Medical Journal Abstracts" gives us practical tips and how-to suggestions for getting the most from abstracts of medical journal articles. As researchers and practitioners, we can't read everything, but we can certainly skim abstracts of medical journals as a way of targeting our research efforts, and unlike the full texts of many medical journals, access to the abstracts is free. "Medical journal research exposes you to such a variety of information that your knowledge-base grows exponentially with regular use," says Georgia Green.

It's not only medical language that is dynamic, but current usage is also a moving target. Punctuation and grammar are important reference points for current usage. Style and format are essential ingredients in rendering complete and accurate medical documentation. Ellen Drake's article, "A Quick Primer on Hyphens," provides punctuation tips and guidelines for students and practitioners alike. The principles of correct use of hyphens presented in this article cover the bases, and the quick-reference list of some frequently used hyphenated (or not) terms will come in handy for all of us. In addition, the Hyphen Exercise is a challenging self-evaluation test, and immediate feedback is provided with the correct answers.

On the business front, Philip Cohen of PRN Funding, LLC, shares his expertise in financing medical transcription businesses. In "Factoring: Alternative Financing for Medical Transcription Services" he deals with the real-world problem of managing cash-flow problems in today's fast-paced business world.

Rounding out this 55th issue of *e-Perspectives* since its establishment in 1990 is our regular column of "What's New in Medicine"—four pages of new, difficult, and hard-to-find medical words and phrases. Talk about a moving target—medical terminology is certainly that. We try to identify the words and phrases that are going to appear in medical dictation and research in the near future. It's a challenging task. As long ago as 1983-84, Vera Pyle wrote "A Medical Transcriptionist's Fantasy," highlighting the need for medical transcriptionists to know the new terms *before* they appear in dictation. If Vera Pyle were here today, she would think that today's research capabilities do indeed allow us to live out her fantasy.

Sally C. Pitman

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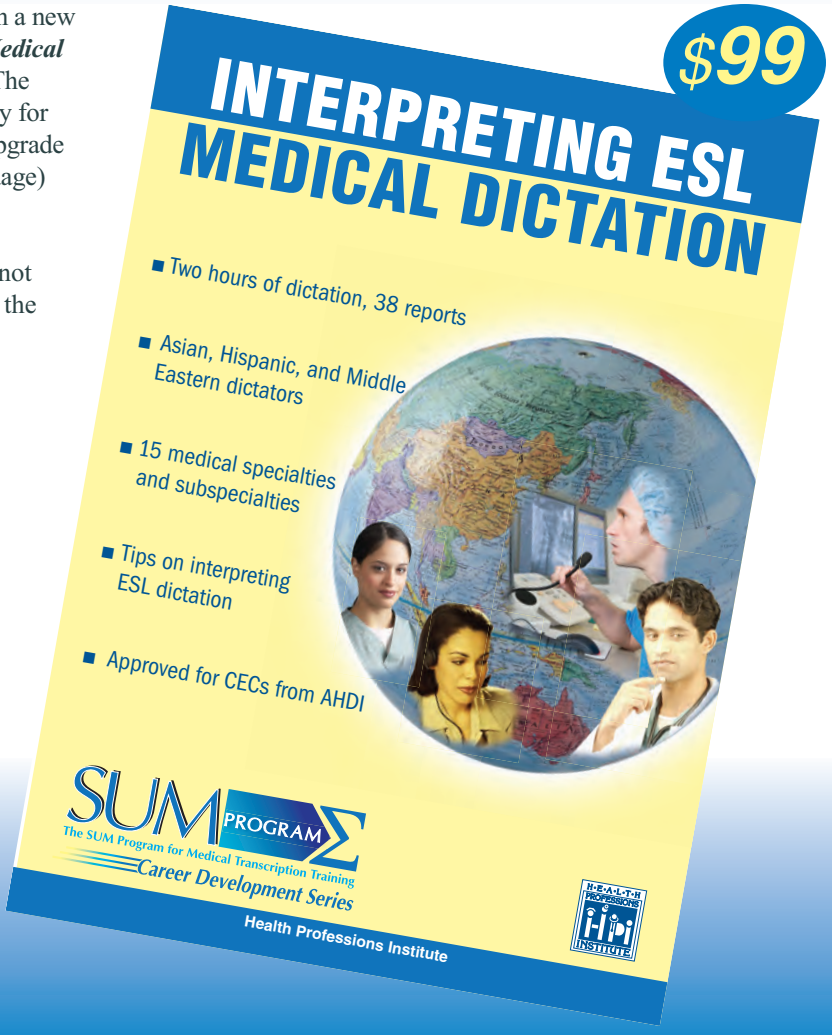

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We have a new weekly e-letter service for MT students that includes study tips and a short quiz on terminology, anatomy, grammar, editing, professionalism, etc.

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Nothing Could Be Finer: Nanotechnology in Medicine

by John H. Dirckx, M.D.

Ever since the Greek philosophers Leucippus and Democritus postulated, in the fourth century BC, that all matter is composed of invisibly small and indivisible particles ("atoms"), human ingenuity has been seeking ways to confirm and elaborate that notion. The development of the microscope by Antonie van Leeuwenhoek and others in the seventeenth century of our era opened the door to the fine structure of matter, including living things, and carried investigators a step closer to finding its ultimate components.

At the beginning of the nineteenth century the English scientist John Dalton published a refined version of the primitive atomic theory of the Greeks, unifying and explaining certain basic facts in chemistry. Dalton believed that all matter is composed of atoms; that the atoms of any given element are identical to one another, but different (in weight) from the atoms of all other elements; and that atoms combine, in ratios that can be expressed in small whole numbers, to form molecules (compounds). During the past 200 years, a huge accumulation of empirical data and world-changing advances in technology (including the development of nuclear weapons of mass destruction) have lent powerful support to Dalton's theory.

Meanwhile, the electron microscope, developed during the first half of the twentieth century, has improved on the resolving power of the light microscope by a factor of about 1000. That is, whereas the maximum magnification possible with lenses that refract a beam of light is about 2000X, the best electron microscopes now achieve a magnification of about 2 000 000X.

Besides revolutionizing the study of nature and permitting the exploitation of its resources for good or ill, these increasingly minute investigations have become the basis of most of the advances in modern scientific medicine. Biochemistry (from enzymes and hormones to DNA and energy metabolism), histopathology, microbiology, pharmacology, diagnostic imaging—none of these could have reached its present state without the unremitting pursuit of the infinitesimal.

Nanotechnology is a burgeoning new field of pure and applied science that studies and manipulates matter on a submicroscopic level, where things are measured in nanometers and nanograms. In the International System of Units (SI), the prefix *nano-* (from Greek *nanos* 'dwarf') signifies 'one billionth'. That is, 1 nanometer (nm) is 0.000000001 m or 1 x 10^{-9} m. We're accustomed to referring to very large figures, such as that representing the distance from the earth to a star, as *astronomical*. To give some notion of the degree of smallness of things measured in nanometers (nanograms, nanomoles):

- One nanometer (1 nm) is to 1 m as the diameter of a marble is to the diameter of the earth.
- The smallest bacterial cells are about 200 nm in length.
- A DNA molecule weighs 1 pg (picogram), or 0.001 ng, or 0.000 000 000 001 g.

In 1974 the Japanese physicist Norio Taniguchi coined the term *nanotechnology* to describe research and development in which matter is manipulated one atom or one molecule at a time. The original context for such investigations was in the field of manufacturing, where it had become possible to deposit films one molecule thick and to use a beam of ions like a drill or saw to shape extremely small products.

Although to date much of the work in nanotechnology has been theoretical, advances of commercial importance have been made in the manufacture of computer microchips and in the production of polymers and colloids to serve as protective coatings for fabrics and other materials. Examples include the use of nanoparticles of zinc oxide and titanium dioxide in paints, varnishes, sunscreens, and cosmetics, and of silver in food packaging and clothing fabrics.

Because it holds the promise of dramatic advances in chemistry, physics, engineering, and robotics, nanotechnology has swiftly expanded to incorporate and enrich all those fields. Fledgling disciplines that have progressed rapidly with newly acquired resources include interface and colloid science, supramolecular chemistry (which studies relationships and forces other than covalent bonding among molecules), and cluster physics (which studies the relationship between the number and arrangement of atoms in a material and its physical properties such as color, density, and magnetic attraction).

A central theme of work in this field is the change in the mechanical, electrical, thermal, optical, and catalytic properties of matter when it is observed in nanoscale. An isolated protein molecule has a much higher surface-to-volume ratio than a visible aggregation of billions of such molecules in the form of a crystal. At nanoscale, copper becomes transparent, gold behaves like a liquid, and chemically inert platinum acquires potent catalytic powers.

A **carbon nanotube** is a cylindrical molecule composed of an extremely large number of carbon atoms. Although the diameter of a nanotube is measured in nanometers, it may be several millimeters in length. Some nanotubes have only one wall, while others have several concentric ones. A nanotube can be threaded inside a larger one. Adjacent nanotubes tend to weave themselves together to form "ropes" or "wires."

The unique interatomic bonding of such structures gives them remarkable tensile strength and unusual electrical properties. Carbon nanotubes have been detected in Damascus steel and may account for some of its celebrated strength. (Steel is an alloy of iron and carbon.) Fibers composed of carbon nanotubes have been incorporated in polymers to enhance their durability and modify their thermal and electrical conductivity.

One mode of proceeding in nanotechnology is by a series of stages in which increasingly smaller tools produce still smaller tools until a sufficiently fine scale had been reached. This so-called top-down approach to nanotechnology copies age-old manufacturing strategies but carries them out at a level requiring brand-new instrumentation.

By contrast, in the bottom-up approach, materials and devices are directed to assemble themselves from molecular components. Using as their model the replication of DNA and RNA (the basis of genetics and protein synthesis), chemists have devised systems in which certain molecules can recognize certain other molecules, with which they are directed to bond in a specific configuration. As such methods become more sophisticated, increasingly complex molecules can be assembled.

Another kind of bottom-up assembly, called molecular beam epitaxy, permits precise layers of atoms to be deposited on a surface, again with the possibility of an extremely intricate final product. This and many other items on nanotechnology's agenda may seem to pertain to the realm of science fiction (see box) rather than of the factual or the possible.

Each advance in nanotechnology calls forth an explosion of new techniques and devices. Methods of measuring the size and surface charge of nanoparticles in solution are based on microelectrophoresis, light scattering, ultrasound attenuation spectroscopy, and electroacoustics. Devices that make it possible to see structures in nanoscale include the atomic force microscope (AFM), the scanning tunneling microscope (STM), and the scanning acoustic microscope (SAM).

The tip of a scanning probe microscope can be used to maneuver nanostructures into position (a process called positional assembly). In nanolithography, an atomic force microtip can function like a pen, depositing a chemical substance on a surface in a desired pattern.

Surely You're Joking, Mr. Jones!

Historians of twentieth-century science trace the idea of nanotechnology (but not the term) to a talk given by Richard Feynman at a meeting of the American Physical Society at Caltech (The California Institute of Technology in Pasadena) on December 29, 1959.

Feynman was an American physicist best known for his work on quantum electrodynamics, for which he shared a Nobel Prize in 1965. During the early 1940s he collaborated with J. Robert Oppenheimer on the Manhattan Project, which culminated in the production of the first atomic bomb. Shortly before his death in 1988 he served on the presidential commission that investigated the space shuttle *Challenger* disaster.

Like some other Nobel laureates, Feynman was thoroughly eccentric. An inveterate prankster, he enjoyed a broad range of unrelated interests, including bongo drums, juggling, lock picking, and Mayan hieroglyphics. Besides several works of popular science, he published two semi-autobiographical books of humor, *Surely You're Joking, Mr. Feynman!* and *What Do You Care What Other People Think?*

The talk at which he broached ideas later recognized as pertaining to nanotechnology was entitled "There's Plenty of Room at the Bottom." He described a process by which the ability to manipulate individual atoms and molecules might be developed, using one set of precise tools to build and operate another proportionally smaller set, and so on down to the needed scale. He also predicted some of the changes in physical properties of matter that occur with change of scale. You can read his talk at **http://www.zyvex.com/nanotech/feynman.html**

About a decade before Feynman gave his supposedly epoch-making talk, I read a story entitled "Tools of the Trade" by Raymond F. Jones, an electrical engineer and prolific author of science fiction, in the November 1950 issue of a magazine called *Astounding Science Fiction*. A crucial element in that story is an advanced manufacturing process called the molecular spray:

"It was a means of building up three-dimensional objects of unlimited complexity by spraying on molecules in precise streams of variable constituency. The spray was keyed by an intricate matrix system that steered automatically the tool mechanism and changed the quality of the molecules from uranium to soft putty if that was called for. It was possible to leave channels, build in wiring, and assemble parts in any degree of intimacy required by design, a degree far surpassing that possible by clumsy nut and bolt or welding techniques."

Some of the changes in physical properties that occur at nanoscale have proved to be obstacles to mechanical and chemical manipulations on this level. Nanotechnicians refer to the problems of "fat fingers" (clumsiness of available instrumentation to handle ultrafine structures) and "sticky fingers" (the tendency of components to adhere to tools instead of staying where they are put).

Some observers, including investigators for the National Science Foundation, have warned that much of the work currently being labeled nanotechnology is just garden-variety materials science in which materials at nanoscale play a passive role. In contrast, the design and construction of **nanodevices** represent genuine technologic advances. A nanodevice is a machine—that is, an apparatus capable of doing work—whose dimensions are measured in nanometers.

A **transistor** is a semiconductor (a device of variable and controllable conductivity) that functions as a switch or amplifier in an electronic circuit. The operation of transistors depends on the conductive properties of a small group of elements, including silicon, germanium, and gallium, with which they are made. Transistors are components of all modern electronic devices, and without them the modern computer could never have come into existence.

The hard drive of the computer on which you are reading this article contains several million transistors, some or all of which may be smaller than 100 nm. Clearly a kind of nanotechnology is already involved in the manufacture of computers, but current efforts are directed to the fabrication of transistors less than 20 nm in diameter.

A **pair of nanotweezers** is a tool capable of grasping and manipulating objects at nanoscale. One kind of nanotweezers consists of two multiwalled carbon nanotubes so arranged that they can be brought together like the jaws of a pair of tongs when one is made electrically negative with respect to the other. With such a device, researchers have succeeded in performing simple mechanical tasks on a submicroscopic scale.

An entirely different type of nanotweezers consists of two strands of synthetic DNA that can be zipped together by a third strand under the influence of a change in chemical environment. DNA has also been used to construct a nanodevice capable of reversible angular movement, like a subminiature elbow or knee. DNA molecules, like carbon nanotubes, are rigid and have clearly understood structures and internal dynamics. Moreover, DNA sequences can be fabricated in any configuration by means of existing technology and replicated in batches of literally billions at a time.

Nanorobotics refers to the design and fabrication of self-actuated and self-directed devices at nanoscale. A robotic molecular assembler would manufacture structures by placing a series of parts into position one at a time. Devices have already been made that use robotic arms to assemble simple nanostructures in 3 dimensions while the process is monitored by scanning electron microscope.

A **biomotor** is a naturally occurring molecular structure equipped with a moving part like the rotor of an electric motor. Adenosine triphosphatase (ATPase), an enzyme used by all living cells to convert food into energy, has such a structure. Each molecule of ATPase contains an elongated protein shaft surrounded by three proton channels that function like the static coils of a motor. By modifying this molecule with nonbiological materials (nickel, silicon nitride), nanoengineers have created nanomotors fueled by adenosine triphosphate (ATP). Devices based on other molecules have been fueled by light or by captive bacteria.

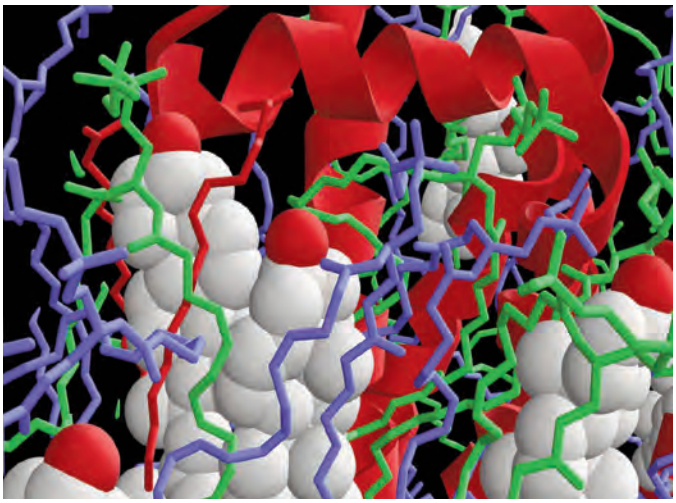
Virtually every advance and development in the physical sciences, engineering, and technology has the potential of impacting medical theory and practice. Nanomedicine is already a multi-billion-dollar industry, and further billions, including substantial contributions from the National Institutes of Health, are being spent in exploring its wider possibilities.

Despite the advanced state of sophistication that many branches of medical science have reached, current methods of **drug delivery** still leave much to be desired. The administration of drugs by the oral route can only be described as a hit-or-miss process. Current knowledge of the absorption and distribution of drug molecules is sketchy at best. For many drugs, therapeutic effects are inadequate and adverse effects troublesome because dosage forms in current use do not precisely target receptor sites.

Nanotechnology promises improvements in drug delivery through the fabrication of lipid- or polymer-based nanoparticle systems. Because of their extremely small size, nanoparticles can cross membranes and enter cells more readily than larger particles. Modification of particle size and electromechanical properties can direct drug molecules to the tissues upon which they are intended to act, keep them away from inappropriate targets, and accommodate them to the chemical environments in which they must function. Besides avoiding toxicity and adverse effects, precise targeting of drug delivery can reduce the total quantity of drug that needs to be administered to achieve its effect, lowering costs.

The term **smart drug** refers to a substance that, after entering the body, becomes pharmacologically active only under certain circumstances. For example, an antibiotic can be bound to a hydrogel molecule that renders it inactive. Only an enzyme produced by a pathogenic strain of *Pseudomonas* can break the chemical bond and release the active drug. Application of the product to a wound or ulcer leads to release of antibiotic only in the presence of *Pseudomonas* infection. Restricting the use of active drug to situations in which it is clinically indicated reduces the risk of allergic sensitization of the patient and of the emergence of strains of bacteria resistant to the antibiotic.

An immunotoxin is another type of smart drug, a hybrid molecule fashioned from a toxin and an antibody. The toxin chosen is a particularly virulent cytotoxin, capable of destroying living cells in minute dosage. The antibody portion of the molecule is designed to recognize surface features of certain types of cancer cells. Immunotoxins administered experimen-



Cholesterol illustration by Michael C. Pitman, Ph.D.

The term **nanoart** refers to two by-products of nanotechnology, both of which blend scientific interest and aesthetic appeal. One kind of nanoart consists of electron microscope scans of real objects and materials at nanoscale that have been computer printed on canvas or art paper. These are primarily art for art's sake.

Another form of nanoart is a representational process in which the intimate details of chemical compounds or organic structures are simulated graphically in three-dimensions by supercomputing. The above illustration shows the interaction of cholesterol (gray spheres) with the light-sensitive retinal pigment rhodopsin (red ribbon) in an environment of saturated and unsaturated fatty acids (blue, green, and red molecular chains). Simulations of this type provide theoretical insights and practical leads for drug design that cannot be obtained experimentally.

tally to patients with hairy-cell leukemia and Hodgkin's cell lymphoma have shown some efficacy in eradicating malignant cells.

Yet a third way in which nanotechnology may enhance the potential of pharmacology is by providing a means of xenografting functional tissue into the human body (for example, islet cells from non-human pancreas for patients with diabetes mellitus) without concerns about immune response and rejection. The alien material is enclosed in a microscopic chamber constructed of crystalline silicon and deposited under the subject's skin.

Precisely drilled pores 20 nm in diameter permit oxygen, glucose, and electrolytes to diffuse into the chamber from surrounding tissue fluids for the support of the islet cells while allowing insulin produced by the cells to diffuse outward and enter the subject's circulation. But these cells are effectively isolated from the subject's immune system, because proteins needed for the recognition and neutralization of foreign material cannot pass through the nanopores. Similarly, encapsulated neurons implanted in the brain might be stimulated electrically to release neurotransmitters to correct disorders such as parkinsonism and Alzheimer dementia.

It has long been known that pairs of large molecules in biological systems often fit together in lock-and-key fashion. This is true, for example, of hormones and their receptors as well as of antibodies and their targets. By means of nanoengineering it has been possible to fashion **artificial receptors** consisting of films of polysaccharide-like material imprinted with patterns of shallow indentations into which certain proteins, enzymes, and antibodies precisely fit. With such tailor-made receptors it may be possible to isolate and assay specific molecules, monitor drug levels, control drug release, and mimic biological receptors.

A **quantum dot** (the name Qdot is a registered trademark of Quantum Dot Corporation) is a nanoparticle of cadmium selenide that emits a quantum of light energy when it is exposed to ultraviolet light. These particles behave much like the dyes currently in use in fluorescence microscopy and fluorescence in-situ hybridization, but they glow much more brightly and yield a higher-contrast image. Quantum dots to which specific protein molecules have been bonded can seek out and fuse with specific substances (drugs, antigens, enzymes). They can be inserted into cells to monitor metabolism, drug distribution, or disease processes. They can also penetrate and label cancer cells.

Photodynamic therapy is a noninvasive and precisely targeted nanomedical method of destroying cancer cells. Nanoshells coated with a thin layer of gold and equipped with specific antibodies can be made to fuse with malignant cells that have distinctive surface proteins. Irradiation of the tumor with an infrared laser, which penetrates skin and other tissues harmlessly, causes the gold to become hot enough to destroy cancer cells without damaging other cells. Light can also be used to release a cytotoxic concentration of oxygen molecules from nanoparticles that have become bonded to tumor cells.

Another application of photodynamics is an experimental "**flesh welder**," which could revolutionize surgical technique. A suspension of gold-coated nanoshells placed at the interface of two wound edges and heated with an infrared laser can produce a virtually seamless union of tissues.

A **dendrimer** is a synthetic nanoparticle whose core supports an outer structure of intricately branched hooks. These hooks can provide sites of attachment for large molecules, such as DNA or cancer chemotherapy drugs. Unlike viral vectors currently used to deliver genetic materials inside cells, a dendrimer can enter a living cell without triggering an immune response. By mimicking mammalian cells, dendrimers can also trap and deactivate influenza virus particles.

Nanonephrology deals with the study of kidney structure and function at the atomic level, imaging methods to observe renal cell metabolism, and the use of nanoparticles to treat kidney disease. A distant goal is the construction of a nanoscale artificial kidney that can safely and effectively assume the function of kidneys in end-stage failure.

As discussed earlier, **nanopores** are apertures of precisely controlled diameter artificially created in nanomaterials. Nanopore technology offers the possibility of designing filtration

systems of advanced efficiency and exact control. The passage of materials through a nanofilter or nanosieve depends not only on pore size and shape but also on electrical charge. An artificial membrane composed of nanotubules with diameters of 2 nm and carrying a positive electrical charge will permit only negative ions to pass, and vice versa. Control of ion transport opens the door to an almost limitless range of interventions in organic and metabolic disease.

When strands of DNA are electrically propelled through an artificially designed protein channel with a diameter of 2.6 nm, the individual nucleotides can only pass one at a time. Changes in ionic current can be used to distinguish base pair sequences in roughly the same way that a Coulter counter distinguishes between red and white blood cells, or between monocytes and lymphocytes. With the ability to read as many as 1000 base pairs per second, such a device could provide a means of rapid genome sequencing.

Some objectives of nanomedical research lie farther off in the future. One of these is **neuroelectronic interfacing**, a process whereby a computer could be linked or networked to the human nervous system. Besides its obvious advantages for research and diagnosis, such a development might permit made-to-order devices to take over the functions of parts of the nervous system impaired by disease or injury

Achieving this goal calls for nothing less than the ability of a man-made machine to detect, interpret, and respond to neural signals. Although neural impulses are indeed electrical, they do not flow through nerve fibers in the same way that power flows through the wiring in a building. Formidable problems of insulation, energy source, electromagnetic interference, and biocompatibility remain to be solved.

Equally far from realization is the development of **molecular assemblers and nanorobots** to perform medical or surgical tasks within the living body. A device of this type would be injected into the circulation, which would carry it to its site of action. In order to pass through the circulatory system without being trapped in capillaries, its maximum size would be about 3 micrometers. As mentioned earlier, carbon nanotubes are the building blocks of choice for nanodevices. If these nanotubes are fashioned from atoms of C 13 rather than from the more usual C 12 isotope, their position and activity can be traced in the body by MRI.

What functions would medical nanorobots be designed to perform? Within a few decades, researchers hope to have nanomachines that can cross biomembranes, enter living cells, recognize and manipulate molecules, disassemble damaged structures, and build others anew. Synthetic nanorobots might also be programmed to mimic the structure and function of naturally occurring ones such as red blood cells, which transport oxygen and carbon dioxide; neutrophils, which attack and destroy invading microbes and dispose of tissue debris; and fibroblasts, which build or repair connective tissue by producing and depositing collagen fibers.

Each device in the first generation of medical nanobots would be programmed to perform a single task. Later machines would be more versatile, functioning as "general practitioners" with a broad repertory of skills. The ultimate goal, perhaps not altogether beyond human potential, is to free the human body from the need to correct and repair its own problems, to fight its own battles with pathogenic microorganisms and heal its own wounds, by mobilizing a workforce of nanorobots.

For more than two decades, bioengineered viruses, bacteria, and human blood and tissue cells have been used as vectors to insert therapeutic DNA sequences into the nuclei of defective human cells. A strain of salmonella organisms that has been deprived of the genes that enable it to produce purines for nucleic acid synthesis can thrive only in the purine-rich environment of a rapidly growing malignant tumor. If these bacterial cells are equipped with genes that enable them to produce proteins, enzymes, or other agents to suppress cell proliferation, their concentrating in tumor tissue can focus such effects against malignant cells.

Theoretically the genetic material of a cell could be programmed much like a computer. Chemical structures have already been designed that can operate like a toggle (on-off-on-off) switch in a computer circuit. A switch of this kind can be actuated by a change of chemical environment, and might thus become a component of a system in which the presence of a drug or chemical could turn on a specific gene.

The genomes of some microorganisms have now been fully sequenced. It should theoretically be possible to construct from scratch a stripped-down genome that, when inserted in an enucleated living bacterial cell, could direct all vital functions. This "biobot" could be programmed, in addition, to synthesize hormones, enzymes, cytokines, or other substances lacking in a given patient, or to absorb and destroy harmful substances.

The proposed construction of artificial organisms involves building a synthetic genome to order and installing it in an enucleated pluripotent (stem) cell. Similar technology may also provide a means of curing genetic diseases. A nanorobot introduced into a living cell could extract defective genetic material from its nucleus and replace it with normal chromosomes previously manufactured to order. The subject's genome would serve as a master blueprint for the replacement chromosomes and the nuclear transplant surgery.

There is no telling how soon nanomedical terms will begin appearing in medical dictation and transcription. But it probably won't be long.

1 Clinical Medicine
CE credit approved

John H. Dirckx, M.D., is the author of *Laboratory Tests and Diagnostic Procedures in Medicine* (2004), *Human Diseases*, 2nd ed. (2003), *H&P: A Nonphysician's Guide to the Medical History and Physical Examination*, 3rd ed. (2001), published by Health Professions Institute. He is an editorial consultant to the publisher of Stedman's medical reference books and medical editor of HPI publications.

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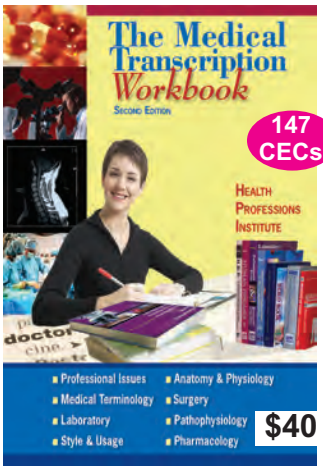

The Medical Transcription Workbook, 2nd ed., helps MTs and students identify, learn, and assess their knowledge of medicine and professional issues.

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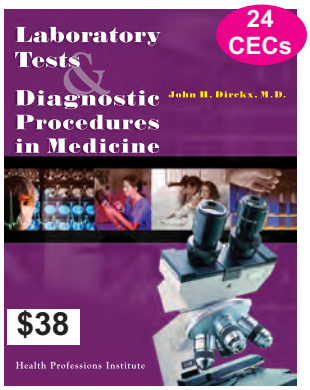
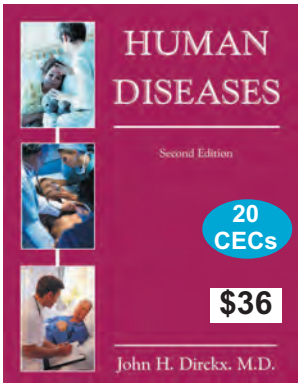
Laboratory Tests and Diagnostic Procedures in Medicine, by John H. Dirckx, M.D., was written especially for MTs and covers diagnostic studies, including imaging, EEG, EMG, endoscopy, electrophysiology, genetic testing, and more. It also includes the lab and path studies that are important to MTs for understanding what's going on in the report and editing, and for risk management, coding, and chart analysis.



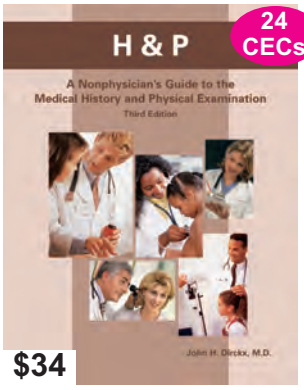
Other features include more extensive illustrations, historical sidelights, a glossary, an index, and reference values.

Human Diseases, 2nd ed., covers diseases commonly encountered in dictation, including causes, symptoms, diagnostic tests, diagnoses, and treatment regimens. Dr. John H. Dirckx's clear writing and topical organization make it an easy-to-use desk reference on disease processes. It includes:

- Chapter outlines
- Learning objectives
- Labeled illustrations
- Special interest boxes on word origins
- Glossary
- Comprehensive index
- "Case Study: You're the Doctor" where readers make medical and ethical judgments from the physician's perspective.



The third edition of ***H & P: A Nonphysician's Guide to the Medical History and Physical Examination***, by John H. Dirckx, M.D., aids in deciphering difficult dictation and can be used as a study aid for credentialing exams.



Chapter exercises help build vocabulary, increase understanding of medical concepts, and develop decision-making skills:

Review and Summarize
Pause and Reflect
Collaborate and Share
Explain and Learn
Extrapolate and Project
Relate and Remember
Generalize and Apply
Compare and Contrast
Relax and Play

The new 11th edition of
Vera Pyle's Current Medical Terminology,
is available only in electronic format and is now downloadable from our web site:

www.hpisum.com
www.SUMprogram.com

H·E·A·L·T·H PROFESSIONS INSTITUTE

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The Best Things in Life Are Free:

How to Use Medical Journal Abstracts

Georgia Green, CMT, FAAMT

Medical journals provide information that improves the quality of medical care as well as offer continuing education opportunities. They are published primarily for physicians, but they can serve a similar purpose for medical transcriptionists (MTs), providing continuing education opportunities and also improving the quality of the care MTs render by improving the quality of transcribed reports. Specifically, medical journals are an ideal resource for (1) locating terminology, (2) building a medical knowledge base, and (3) determining current usage. But best of all, medical journals are indexed in an easy-to-use Internet database, and the abstracts, which contain all the key information, are free!

As a terminology resource, you can rely on medical journals, and their abstracts, for new, old, and hard-to-find terminology. You can determine a correct spelling when other resources disagree. They are a wonderful resource for eponyms because inventors of new procedures or equipment always publish their research. For example, there is a cardiovascular surgery called a "maze procedure," which you may find listed incorrectly in some resources as an eponym, i.e., a Maze procedure, or even as an acronym, MAZE. A medical journal search will prove that the inventor of this procedure named it for the puzzle, i.e., a maze, and it is neither a proper noun nor an acronym.

What you are less likely to find in medical journals are casual medical slang or exhaustive lists of brand names. Brand names are discussed in the context of a new type of product or when associated with the only brand of a particular product. If you can't find a brand name in a medical journal search, it just means its name was not mentioned—not that it doesn't exist.

A knowledge-base resource is one that helps you build your understanding of medical concepts. It isn't enough to know how to spell terms if you can't be certain if you are using them correctly. By researching a particular medical procedure or treatment in a medical journal, you can learn the why and the how, instead of just the what, making it less likely that your work will contain critical medical errors. Medical journals aren't the only resource for this level of detail, but medical journal research exposes you to such a variety of information that your knowledge-base grows exponentially with regular use.

Medical journals are actually the only genuine source of current usage. Usage is dynamic—it is always changing—and traditional print resources, including dictionaries, word books, and style guides, take much longer to roll off the press than do medical journals, which are published at shorter intervals, often monthly or in some cases even weekly. A random Google search (**www.google.com**) may tell you what else might appear in print anywhere on the Web but not what should be transcribed in a medical report, whereas peer-reviewed medical journals are subjected to scrutiny of both content and style. Note also that MT reference books take their cues on current usage from medical journals. Instead of waiting for the next edition of a word book to find out if a two-part term has dropped its hyphen, you can search current medical literature yourself and stay ahead of trends.

So does it make sense to bypass word books and go straight to medical journals as a primary research tool? No. In fact, you are likely to find it more convenient to use certain MT-specific reference books because they are focused on MT needs, portable, following you from work station to work station, and are still available even when the Internet isn't. Some MT reference books also come on CD, adding electronic search capability to the reliability of a resource written specifically for an MT audience. So there will be times when you will want to reach for a book or launch a software reference before searching medical journals.

Even among online reference tools, medical journals may still not be your very first stop, depending upon what you are looking for. If you know a term but just need a spelling, go to **www.onelook.com** where you can search *Dorland's*, *Stedman's,* and *Webster's* with a single mouse click. If you aren't even sure what you heard and can't establish the type of word or phrase you need, you might Google a phonetic spelling or a known phrase in your document (also known as a context search) just to see what comes up. However, you will then want to do a medical journal search to confirm information you find elsewhere, save for brand names. For brand names, go directly to the manufacturer's Web site, but avoid distributors' sites or any other third party.

What Is in a Medical Journal?

Medical journals contain peer-reviewed articles. *Peer-reviewed* means that the publishers of a medical journal don't just receive an article and print it after a little bit of copyediting. Instead, they send it out to multiple experts in the author's own field—his or her peers—and ask for a critical review. Experts analyze the relevance and accuracy of the research and ensure that the author's conclusions stand up to scientific scrutiny. There may even be blind reviews in which references to the author are removed so that any research reported is judged fairly. Peer-reviewed articles go through many sets of very professional eyes. The names of people and drugs and

procedures and equipment can be counted on to be correct. It is not impossible for a typographical error to appear in the final copy, but it is rare—and typos are corrected in the medical journal database as soon as they are discovered. This makes peer-reviewed medical journals one of the best resources for both accurate and current information.

Medical journals are published in every medical specialty, including some very obscure and specialized niches. And there are also general topic journals, like *JAMA* (the Journal of the American Medical Association), the *New England Journal of Medicine*, and *Nature*, the major British general science journal. If you've never had occasion to handle a medical journal, you might wonder what's inside. Your personal physician probably leaves copies of *Sports Illustrated* and *People* in the waiting room—not copies of *The Annals of Family Practice Medicine*. Medical journals are expensive to produce, by the way, and the expenses are passed along to the subscriber—they commonly run a couple hundred dollars or more a year. The April 19, 2006, issue of *JAMA* [2006;295(15):1741] describes the contents of medical journals:

• *Research articles report the results of research studies on a range of topics varying from the basic mechanisms of diseases to clinical trials that compare outcomes of different treatments. Research articles on important topics may be covered by the news media after they are published in a medical journal.* (Note that when you read a news story about a new study saying that it is now okay to eat eggs or chocolate, this information came from a research study published in a medical journal—and you can go right to the source of that new story and read the study yourself. Often, so-called news stories actually put a spin on published research in order to make news more interesting. As an MT with a medical vocabulary, you have the ability to analyze published research for yourself, and you should do so—at least before you overdose on eggs or chocolate or whatever!)

• *Review articles summarize and analyze the information available on a specific topic based on a careful search of the medical literature. Because the results of individual research studies can be affected by many factors, combining results from different studies on the same topic can be helpful in reaching conclusions about the scientific evidence for preventing, diagnosing, or treating a particular disease.*

• *Case conferences and case reports may be published in medical journals to educate clinicians about particular illnesses and how to treat them.*

• *Editorials in medical journals are short essays that express the views of the authors, often regarding a research or review article published in the same issue. Editorials provide perspective on how the current article fits with other information on the same topic.*

• *Letters to the editor provide a way for readers of the medical journal to express comments, questions, or criticisms about articles published in that journal. Short research reports and case reports may also be published as letters to the editor.*

How do you know which medical journal(s) you should consult? Before the Internet existed, you had to live near a teaching hospital or a medical school to get your hands on an assortment of medical journals. Today, virtually all medical journals are made available online, although full articles can be viewed only by subscribers. The abstracts, however, are free. And it turns out that abstracts are all an MT needs!

What's an Abstract?

Review articles and case conferences/studies are really the meat of medical journals, but they can be lengthy and full of research jargon, making them difficult to read. This is true not only for MT readers but also for physicians. They want an overview of an article in order to determine if they need to take the time to study it in detail. They are looking for a short summary that covers the relevant points, i.e., what was studied and why, what was involved, and what were the conclusions? Authors provide this information at the beginning of articles in the form of abstracts—a summary paragraph that reduces all the gobbledygook into just the main points.

The best part about an abstract (other than being free) is that the author really has written it with the needs of the MT in mind, although not intentionally so. What starts out as a 10- or 15-page research report has been distilled into a single paragraph that includes all the important terms (drug names, procedure names, equipment names, eponyms) and medical information (recommend treating disease X with 100 to 200 mg of drug Y but never drug Z in any form) and examples of current usage (capped, hyphenated, whatever). Nearly all of the extraneous information (extraneous to the needs of the MT) has been filtered out, including most of the language that describes research studies that a dictator would never use in a medical report.

Searching Medical Journal Abstracts on PubMed

And now it's time to meet PubMed (**www.pubmed.com**). PubMed is a free search engine of the MEDLINE database of the United States National Library of Medicine at the National Institutes of Health. It indexes over 5000 medical journals from more than 80 countries, from the 1950s to as recent as this afternoon. This article introduces some basic search tips, but the best way to get the most from PubMed is to go through the tutorial on the PubMed site. This is recommended even if you are already a regular user of this search engine. The link to the tutorial appears on the left side of the PubMed home page and is clearly marked. It's invaluable. In addition, extra features are available to those who register for a free NCBI account. This link is also available on the PubMed page.

After registering for a free NCBI account and signing in, click on "MyNCBI" in the blue panel on the left side of the window. Then click on "user preferences." Choose a highlighting color, and all of your search terms will be highlighted when you display your results as abstracts, making them easier to see.

You can always just type in any old word or phrase, click Go, and you will get results. It can be that simple. But you can also make use of search techniques to narrow down your results, giving you a better chance of getting useful information very quickly.

• Use AND, OR, or NOT with search terms. Example: **liver disease NOT cirrhosis**.

• Use quotations for specific phrases. Example: "**heart disease**" produces different results than just **heart disease** without the quotes (which would pull every record with the word "disease" whether or not it contained "heart").

• Use parentheses to combine terms and asterisks for wild cards. Example: To find out if hip replacements are being done endoscopically, do a search for **(total hip arthroplasty) AND endoscop*** to yield the results of every combination of the first phrase with all words that begin with endoscop, e.g., endoscopy, endoscopies, endoscope, endoscopes, endoscopist, and so on.

Resolving Conflicts

With basic search techniques, you can easily find new, old, and hard-to-find terms. You can also read through abstracts to look for medical concepts. But how do you resolve disputes between references? Although no reference is completely error free, most conflicts are a result of differences in current usage at the time the reference went to print. When references disagree, you have to make a choice. Choosing the newer reference isn't automatically the right choice as current usage preferences can change in a matter of months, and the research supporting any textbook appearing in print is going to be at least 6 months old the day it is published. The smart thing to do in the case of a conflict is a quick literature search on PubMed to determine current usage for yourself.

Here's an example of resolving a conflict. One dictionary shows *caliceal* and another shows *calyceal*. Which one do you use? Searching PubMed for **caliceal NOT calyceal** yields 371 cites, while **calyceal NOT caliceal** comes up with 333 cites. This is not really a significant difference; both spellings are regularly used. This means that you can use either spelling unless your employer has expressed a preference, although you should be consistent within a single document.

A tougher one to evaluate is the international normalized ratio, a derivative of the prothrombin time. You can find it in various references as *PT-INR*, *PT/INR*, and less frequently as *PT INR* or *PTINR*. A PubMed search shows **PTINR** with just 1 and **PT INR** with 5 citations. "**PT/INR**" (searched in quotes to retain the punctuation) is used in 20 articles, while **PT-INR** is used in 78. Hyphens are disregarded by PubMed, even if you put a term in quotes, so in this search it was necessary to display the complete abstracts and then use Ctrl+F to locate which articles used *PT INR* and which used *PT-INR*. That *PT-INR* wins out over *PT/INR* actually makes sense when you consider the meaning of the term. It is not the ratio of the PT to the INR but the ratio of the patient's PT to a control sample PT, raised to the value of an international standardized value. The result of this calculation is the *INR*, or more correctly, the *PT-INR*.

Basic Search Steps

Let's do a quick review of the basic steps for a PubMed search. You can do a random search, or you can practice searching in an organized fashion, making use of all the tools at your disposal:

- Identify the concepts in your search.
- Think of synonyms and alternative ways of expressing each concept.
- Arrange synonyms for the same concept in a group.
- Connect your synonyms with OR, and/or place in parentheses.
- Connect your concepts (or groups of synonyms) with AND, NOT, or proximity operators.
- Expand or contract your search as necessary.
- Interpret your results (repeating search steps as necessary).
- Draw conclusions based on your interpretation.

Interpreting Search Results

With the PT-INR example, we needed to look closely at the search results to determine if any factors needed to be taken into consideration. Consider each of the following as you evaluate your search results:

• **Translated articles**. Articles indexed in PubMed appear in English, but if they were originally published in another language, they have been translated into English. Translations may be scientifically accurate, but translators are often not native English speakers and cannot be relied upon for current usage. Spelling questions should not be settled with a translated article unless it is the only citation available. Click the Limits tab and check the box for English only, but look at your results and check for the original language as some translated articles may slip through. Ignore Canadian and British journals, which will contain British English spellings.

• **Age of research**. PubMed goes back to 1950 in some cases. You want to toss anything more than a few years old

Up Close: Analyzing an Abstract

Although an abstract is intended as an easy-to-read summary of a much more detailed article, it may not appear completely MT friendly on first glance. Let's look closer at a complex abstract to see just what we can learn from it.

> In developed countries at least, ulcers related to *Helicobacter pylori* infection are becoming rarer. However, ulcers associated with the use of nonsteroidal anti-inflammatory drugs (NSAIDs) remain a major clinical problem, which has not been solved through the introduction of selective inhibitors of cyclooxygenase-2 (COX-2).

What **medical terminology** can we glean from this section? *Helicobacter pylori*, nonsteroidal anti-inflammatory drugs (NSAIDs), selective inhibitors of cyclooxygenase-2 (COX-2). These may or may not be new terms to you.

What about **medical knowledge**? There are two causes of ulcers under discussion—those caused by the bacterium *H. pylori* and those caused by NSAID drugs (like Advil). Like NSAIDs, COX-2 inhibitors (such as Celebrex) are used to treat arthritis, but in spite of the availability of COX-2 inhibitors, the incidence of NSAID-caused ulcers has not diminished.

Current usage? COX-2 is hyphenated. One abstract doesn't prove current usage; see the complete article for information on proving current usage.

> Recent studies suggest that NSAID-induced ulcers can be prevented largely through co-administration of a proton pump inhibitor to block acid secretion in the stomach. In patients requiring aspirin therapy to prevent cardiovascular diseases, co-administration of aspirin plus a proton pump inhibitor was found to be safer than using another anti-platelet therapy that does not block gastric prostaglandin production (e.g., clopidogrel).

Terminology includes proton pump inhibitor (e.g., Prilosec or Nexium—if you don't know what a term means, look it up to build your vocabulary), gastric prostaglandin, clopidogrel (generic for Plavix).

Medical knowledge: *Co-administration* refers to doing two things at once; they are suggesting that in addition to prescribing an NSAID, it be combined with a PPI (proton pump inhibitor) to block acid secretion that combines with the NSAID to give you an ulcer. If you are taking aspirin for heart disease, combining it with a PPI is safer than using a different anti-platelet therapy (like Plavix).

> Several recent papers have clarified further the contribution of COX-2 to gastric mucosal defense and to the healing of ulcers. In some circumstances, COX-2 produces a highly potent gastroprotective substance (15-R-lipoxin A(4)), and analogues of this substance could have therapeutic value for preventing gastric ulceration.

Terminology: (15-R-lipoxin A(4)) This parenthetical term is the chemical name for a "potent gastroprotective substance." Unless you are looking for this specific chemical name, it isn't necessary to understand complex chemical names as they do not come up often in dictation. Just skip over it. Another term: analogue (similar chemical compounds, not necessarily having the same action).

Medical knowledge: COX-2s defend the gastric mucosa (picture little chemical compounds running around with weapons, if you are a visual learner). They achieve this defense by producing a specific chemical agent, of which analogues (related substances as yet undefined) may prove useful in preventing ulceration. Even if you don't understand it the way physician or a biochemist would, you can't say it isn't interesting!

> Nitric oxide-releasing NSAIDs continue to show promise in terms of limiting damage to the gastrointestinal tract, even when given in combination with aspirin. Recent studies support the notion that platelets make a major contribution to ulcer healing, and the release of several key growth factors from platelets appears to be regulated by proteinase-activated receptors.

Terminology: nitric oxide, growth factors, proteinase-activated receptors.

Medical knowledge: Some NSAIDs release nitric oxide. Which ones? If you want to know this, you can look it up. These NO-releasing NSAIDs show promise (which means you should expect to see more of them around soon) and can be given with aspirin (good for those with heart disease). Proteinase-activated receptors regulate some platelet action (probably a good thing, but it is okay if you can't take this any further).

That you did not understand this abstract on the same level as would a gastroenterologist is expected. If you learned some new terms and concepts, great! The parts that you didn't understand 100% are okay since you weren't looking for that specific information. Some MTs assume that if they don't feel completely comfortable with their understanding of an abstract, the information is not useful, but that is not true.

Abstracts are a research resource as well as an opportunity for continuing education. Spend some time with them and you will learn to enjoy working with abstracts.

unless you are looking specifically for an old term. You can also set age parameters on the Limits tab.

• **Nonhuman or lab research**. You can also restrict your search to human results on the Limits tab. Some MT references are compiled by software mining of medical journal databases, and terms get picked up that would never appear in a dictated medical report. Extraneous terminology, e.g., stuff that happens only to laboratory rats or statistical terminology, pad reference books and add a level of noise you have to dig through. In addition, you end up with more soundalike terms that could lead to wrong conclusions. This is important in your own PubMed research but is also a question to consider when evaluating MT references.

• **Abbreviorrhea**. That's not a real word of course, but it takes just a cursory glance at medical journals and abstracts to see that abbreviations are used heavily. It is standard publishing practice to abbreviate recurring phrases on subsequent use in the same article, whether or not a common abbreviation exists for that phrase. In other words, an abbreviation is made up on the fly for the purpose of that article. This definitely does not correlate with appropriate abbreviation use in transcribed medical reports. Be careful not to assume anything about abbreviations appearing in medical journals. This can also be a problem for MT reference publishers relying on data mining without sufficient MT editorial oversight. Always be suspicious of new abbreviations. Novice MTs must be especially careful not to choose an abbreviation solely because it sounds similar to what is dictated—make sure it fits the context!

• **Lack of brand names**. A mentioned earlier in this article, if a brand name doesn't appear in a PubMed search, check Google. PubMed isn't exhaustive here.

• **Punctuation**. Be aware that some routine marks of punctuation, including hyphens, are ignored in indexing for a search engine. Try putting the term in quotes. If you are unable to isolate the punctuation, as was the case with hyphenation in *PT-INR*, use Ctrl+F to search through the complete text of the abstracts and count them. If there are too many to count, take a representative sample and extrapolate your results.

Drawing Conclusions

If you are searching for a term and you find it, your work is done. If you are settling a dispute about usage or obtain conflicting results, you need to carefully interpret your data, as explained above, but then draw conclusions about how to proceed. In both of the above examples, with caliceal versus calyceal and PT-INR, it was necessary to draw conclusions about the meaning of the results. If usage overwhelmingly favors one result, you can feel confident about your choice. If more than one form of a term is used in hundreds of articles, there may be no clear-cut favorite—and the choice is yours to make. If the results are a little ambiguous, as it was with PT-INR, your conclusions need to take in evidence from other sources, such as considering the mathematical formula that produces the PT-INR. Drawing conclusions after evaluating all the evidence is an example of critical thinking.

In summary, medical journal abstracts are a primary resource for medical transcriptionists. They are freely available and easy to work with, if you learn how to use the PubMed search engine and understand how to interpret your results.

For those who would like to read complete journal articles for personal growth or CECs, you can set Limits to full text at PubMed or you can use PubMedCentral **<http://www.ncbi.nlm.nih.gov/sites/entrez?db=PMC>**, which indexes full-text articles. Some of these articles may be accessed without charge; others may require a fee or a subscription for access.

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MRI procedures.

anvil dunk—a procedure used in laparoscopically performed gastric bypass to construct a gastrojejunostomy. The head of a stapling anvil is used to invaginate the stomach wall in order to bring the surgically created openings in the stomach and jejunum into apposition and stabilize them while they are being sutured together. See also *dunked end-to-end anastomosis.*

beak sign (Radiol)—abrupt, smooth ... the distal esophagus on ... an indication of ...

... perf... plete separa... more sensitive mea... LDL subfractions in plasm...

8-to-S-plasty—a modified technique fo... closing a skin defect shaped like an 8 (two adjoining round lesions). The traditional method of repair by creating a single elliptical defect sacrifices healthy skin. In the Burow 8-to-S plasty, one triangle of skin with its apex at the constriction in the figure 8 is advanced to close one of the circular defects, and the other triangle of skin is advanced to close the other. No incisions are required and no skin is sacrificed. The suture line after closing resembles an "S".

odd facet of the patella—the 7th facet of the articular surface of the patella, being the most medial portion. Only at 135 degrees of flexion does the odd facet contact the medial femoral condyles. Therefore, in most patients, it is a very underused part of the articular surface. Underuse has been incriminated as a cause of damage to the articular surface, an example being chondromalacia.

rendezvous laparoendoscopic technique—a technique used in endoscopic sphincterotomy to facilitate the identification and cannulation of the papilla. Using this technique, a guidewire is inserted through the cystic duct, caught with an endoscopic polypectomy loop, extracted from the operative channel and cannulized with a sphincterotome. This is then pulled through the papilla in the common bile duct, thus completing the "rendezvous

Factoring: Alternative Financing for Medical Transcription Services

by Philip Cohen

When an Arizona medical transcription service owner (MTSO) signed three new clients, things got a little hectic at the office. She was ecstatic about the new business and the growth opportunities it provided, but in order to meet these new demands, she would have to increase the size of her dictation system, have interfaces built, and recruit, hire, and train new employees. She was going to incur meaningful start-up costs and her on-going expenses (mainly payroll and taxes) were going to increase tremendously. Meanwhile, it would be many weeks before her new clients would pay her for her work.

The president was now faced with a dilemma despite her anticipated business growth. Instead of immediately launching into her new contracts, she would first need to spend the next couple of weeks looking for capital. This way she would be completely prepared to meet the demands of her new clients. Having already exhausted her ability to borrow from the bank, she instead went to an accounts receivable factor for the money she desired. With the ability to use the receivables from her new clients as collateral, she would be able to quickly secure the cash needed to meet the expectations of these new clients.

But what exactly can a factoring company do for a medical transcription service? And how common, and more importantly, is it wise to do business with this kind of finance provider?

The business of factoring has literally existed for thousands of years. Whenever someone owed money, there has always been an outside party willing to take a piece of the future income in exchange for providing the instant cash relief to the owed party. The most recognizable modern example of factoring is the credit card. In this case, the host bank pays a merchant immediately, before its customer pays the bill. The bank takes a percentage of the customer's payments in return for the advancement of funds.

Factoring works similarly to the use of the credit card. The factor provides capital in one of two ways: either by purchasing the asset value of a receivable (non-recourse) or by making a loan with the invoices as collateral (full-recourse). When the factoring company buys the value of the receivables, the factor takes the credit risk that the invoice will be paid. The client still retains the performance warranty on the work done for a customer.

Before the factor decides to purchase the accounts receivable, the factor performs a thorough credit check on the customer. If a factor makes a loan against an invoice, which usually occurs when the customer credit is not favorable, its client will continue to assume its own credit risk and will also be liable for any nonpayments.

When a prospect applies for a loan from a bank without having an adequate credit record or a profitable business history, it is not uncommon for the bank to recommend a factor since the prospect is not in the position to pursue conventional financing. The factoring firm can help provide the financial discipline that a prospect needs as well as the opportunity to secure short-term working capital. Banks often see factoring as an interim solution to inadequate credit, until the client is in a better position to secure a bank loan.

A good factor wants to see its client eventually move to a conventional banking relationship and avoids companies that would depend on the factor forever. Any company that cannot establish an exemplary credit history can eventually become a bad risk for any financial partner. Factors are as unlikely as any financial institution to invest money, and even time, into a risky company.

There is often a misconception that the only time to use a factor is when the company is going out of business, when, in fact, the complete opposite is true.

Factors will research a prospective company thoroughly before deciding to accept it or not. Since the factor will operate as a de facto partner or investor by assuming the risk of the company's receivables, it is in the interest of the factor to take on clients that are growing, solvent, and ambitious. A factoring company's ideal partnership would be with a new or reorganized company looking at a bright future ahead. Factors want to work with companies that are in the growth mode.

Until recently, working with a factor was thought to be a sign that the company was hitting rock-bottom due to financial troubles and viewed as the last line in a shaky financial defense for a business. This perception of factoring persisted largely because of the unregulated status of the factoring industry. Now, factors are shaking off that bad reputation because the shady players are being sorted out through a combination of competition and sound operating procedures. Factors watch each other closely and constantly interact, often providing assistance to one another as banks do, which in turn means better service to their clients.

Although accounts receivable factoring companies take on businesses that are unable to turn to banks, they will not take on every single company that asks for assistance. In order to

establish the most effective business relationship with their clients, factors become experts in their clients' business and industry—for example, dealing only with medical or only construction receivables.

It is vital that you work with a factor who has a thorough understanding of you and your medical transcription business plan. Since most factors are discriminating about their clientele, a smart MTSO should be wary of any factor that gives the impression that they are willing to do business with just about everyone.

It is rather rare to find two different factoring companies that operate exactly alike. Each factor has its own methods for running the business, sorting out credit issues, notifying a client's customers, and verifying that the invoices are real and collectible. Generally, the factor discounts the full face value of an invoice by a certain percentage. Rates are most times determined by the risk and the volume of the invoices. Low volume, measured in dollars per month financed, is usually more expensive. If a client guarantees that it will need factoring for a specific amount of time or money, the rate can also be lowered for the client. Some factors may provide annual APR rates, which are tied to the amount of financing outstanding, while other factors will simply discount invoiced amounts.

There are definitely unique benefits to factoring, and even the hardcore skeptics will admit to the benefits. The first of which is *equity* which remains unchanged on the company balance sheet even when deals with a factor are struck. As opposed to a conventional bank loan or credit line, the factoring relationship does not appear as a liability on the business' books.

Also with a factoring company, it takes only a few days from the time you start the application process to the time you receive capital. For companies battling a cash flow crunch (such as a growing medical transcription service), the immediacy of potential capital is often the dealmaker.

High-growth companies benefit from the factor's flexibility. Rather than operating with a fixed line of credit, a factoring firm's credit line can be expected to grow as their clients' billings increase.

The World Wide Web makes it even more convenient for factoring companies to effectively provide account information to their clients. Some factors offer online services that enable their clients to view their key factoring reports over the Internet. With the use of this service, clients are able to check the status of their accounts at any time from any computer that has Internet access. This makes it easier for clients to keep a detailed tracking of their accounts receivable, giving them the freedom to focus their attention on growing their businesses.

Factors that offer an online service must ensure that the factoring reports can only be accessed with the highest level of security, manageability, and privacy for their clients. Factoring companies must also update client reports on a regular basis so that clients are able to view their most recent account data. The online reporting can help factoring companies serve their clients more efficiently by making their financial information conveniently available on a daily basis. This quick and easy access to factoring reports can help answer any questions that clients may have about their accounts receivables.

Just like the MTSO in this article, when established companies experience cash flow problems due to some new, large accounts, factoring can be the best solution to solve their problems. Rather than going through a total re-application of its bank line, a company can use a factor for short-term working capital until the new accounts become self-financing. The company may be surprised at how quick and painless the whole process can be by using a factor.

The flexibility that a factor can offer is one of the highest regarded aspects of the factoring business. Compared with the usually rigid practices of both your neighborhood and downtown bank, a factor can be just the fresh opportunity a medical transcription business needs to boom.

1 Professional Development
CE credit approved

Philip Cohen is the President of PRN Funding, LLC, an accounts receivable factoring company that provides growth capital to small and midsized businesses that service the healthcare industry. Prior to founding PRN Funding, Cohen served as the Senior Vice President/General Manager of The MRC Group, where he was responsible for corporate development initiatives as well as the company's speech recognition product line.
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A Quick Primer on Hyphens

Ellen Drake, CMT, FAAMT

Have you ever noticed how observation is such an important part of learning?

People get way too upset about hyphens (or commas, pick your poison). Think of punctuation as a road sign. Punctuation tells you how to interpret the open road, the curves, and the hills of language. Some punctuation tells you when to stop—a period equals a full stop (guess that's why the British call it that). A colon, dash, or semicolon equals a rolling stop or proceed with caution, not quite a stop. A comma is a pause (I think I see something in the road ahead, oh yeah, it's just a mailbox beside the road).

Hyphens aren't quite like other punctuation marks. They're more of a device to show relationships between words, rather than traffic signals.

I've always encouraged students who have a particular problem (regardless of what it is) to make a point of *observing* instances that they can be fairly certain demonstrate correct use. It's helpful to keep a notebook. Sometimes, just the act of writing something down (or typing it) will help you to remember it. When you make your observations about hyphens, don't just look at the hyphenated term; notice its position in the sentence. What follows it? Is the word that follows a noun? If not, is there a noun close by, perhaps after several more adjectives? If no noun follows and it's hyphenated anyway, maybe it's one of those permanent hyphen compounds discussed below. Look it up in a dictionary and see.

The following discussion covers the most common uses of hyphens. As with other points of style, popular references vary in their recommendations. I generally use a variety of style references and try to go with the consensus. My references are noted at the end of this article.

Adjectives

Permanent Compounds

There are some hyphenated adjective compounds that are always hyphenated regardless of their position in the sentence and will appear that way in your dictionary. These are terms like *#-year-old, on-site, long-term, state-of-the-art*. The *AMA Manual of Style* puts *up-to-date* in the category of permanent compounds, but some English dictionaries no longer do.

If you suspect a compound needs a hyphen, think about whether the words in the compound are always or almost always used together. If the answer is yes, look it up. If you can find it in the dictionary hyphenated, you should hyphenate it whether it precedes the noun or follows the verb. These, by the way, are called permanent compounds. Keep a notebook. As you encounter these compounds, add them to your list. Create an abbreviation expander for them, so that you don't have to think about them or look them up over and over.

Temporary Compounds

The next use of the hyphen with compound adjectives is what we call a temporary compound. When you look at adjectives preceding a noun, try to determine whether they form a single idea in the way they modify the noun.

For example, in a 3-inch scar. You don't have a 3 scar and an inch scar, you have a 3-inch scar. The two words join together to make a single adjective. (Note: The new *Book of Style for Medical Transcription* drops the hyphens in metric constructions in accordance with recommendations from the Système Internationale [S.I.] committee.)

Let's look at something else. *The patient was admitted with a 3-day growth of beard, disheveled, and with a foul body odor*. Does *3* modify *growth* by itself? Does *day*? No, it takes both words combined to make sense out of *3-day growth*. Similarly, another patient has a *7-month pregnancy*.

Words and abbreviations indicating ratios are hyphenated: *BUN-creatinine ratio, I-to-E ratio, A-G ratio*. Note: Abbreviations, but *not* words, indicating ratios can also be rendered with a virgule or slash, e.g., A/G ratio.

Compounds consisting of words that are of equal weight are hyphenated: *obsessive-compulsive, physician-patient relationship, mother-daughter bond*.

Compound Adjectives Containing Participles

A third type of adjective compound is the adjective or noun plus participle (usually the *-ed* but sometimes the *-ing* form of a verb). These compounds are hyphenated when they precede a noun but not when they follow it. Included in this category are words like *well-developed, well-nourished, overworked, over-wrought* (*wrought* is a participle even though it doesn't look like one), *under-paid, fast-paced*, and so on.

Compounds Containing Prefixes

Hyphenate a compound modifier consisting of a prefix followed by a capitalized word, an abbreviation, a number, or a letter. Examples include *non-Hodgkin lymphoma; non-A, non-B hepatitis; anti-RNA; non-AIDS-related infection*.

Use a hyphen after a prefix if the prefix applies to a following phrase rather than a single word. Similarly, use a hyphen after a word that modifies a phrase. Examples include *non-small-cell* lung cancer and *non-insulin-dependent* diabetes mellitus. In a phrase such as *non–small-cell* carcinoma, if your word processor allows it, you may use an *en* dash for the first hyphen and a regular hyphen for the second. Similarly, when a word modifies an entire phrase, an *en* dash may be used instead of a hyphen.

References are inconsistent when hyphenating phrases such as in the examples above. One well-respected medical dictionary has *non-small cell lung cancer* in one location, but *small-cell lung cancer* in another and *small cell lung cancer* in yet another. The rules above, however, are widely accepted; moreover, you should be consistent in typing a phrase the same way each time. Again, pick a style and put it in your abbreviation expander so that you don't have to think about it.

Two Tests for "Compoundness"

When you have two adjectives preceding a noun, see if you can take one out and still have the phrase including the noun make sense. Another trick is to put *and* between the adjectives and still have the phrase make sense. If either of these tricks works, do not hyphenate.

Noun Compounds

The trend to drop the hyphen in compounds is reflected most dramatically in noun compounds. Typically, compound nouns may be nouns or other parts of speech that are put together to mean something new. They often start off as two words, sometimes go through a hyphenated phase, and many end up as one word. *Headache, toothache, stomachache, houseboat, farmhouse, oversight, bookkeeping, southeast, grandfather*, and *pocketbook* are examples. There are no rules that I know of that will tell you when to close a noun compound.

Noun compounds containing a preposition (*in*, *on*, or *to*) are, like adjective compounds containing prepositions, generally hyphenated, for example, *mother-in-law*. Compounds with prepositions in the middle may be permanent or temporary compounds, so it's always a good idea to look these up. Exceptions include *followup, workup, checkup, flareup, onlooker, passerby*.

Stepbrother and *stepmother* are closed but *half sister* is open and *great-grandmother* is hyphenated. *Chief of staff* and *physician assistant* are open. As with adjectives, nouns of equal weight are hyphenated when used as a single unit, as in *fracture-dislocation*.

Proper nouns denoting race, residence, or origin are usually not hyphenated: *New Yorker, African American, Irish Catholic, French Canadian*. Coined or colloquial forms of such terms, however, may be closed or hyphenated (*Aframerican*; *Afro-American*). Consult a dictionary to be certain of use.

Multiple-word terms used for the names of methods, chemicals, diseases, compounds, and functions are not hyphenated nor are commas used to separate these words (*sickle cell disease, basal cell nevus syndrome, sodium chloride excretion, congestive heart failure, atrial septal defect, right upper quadrant, left lower extremity, right upper lobe*). Solitary eponyms used with syndromes, diseases, methods, procedures, tests, and the like are not hyphenated (*Fisher exact test*).

Self- compounds (*self-evident*), whether *self* precedes or follows the noun, are hyphenated (with a few exceptions, e.g., *selfless, myself, himself*), as are *all-* compounds (*all-inclusive, all-out*), and *ex-* compounds (*ex-husband*). Compounds using *half* may be open, closed, or hyphenated (*half-life*, *half-hearted, half sister, halfback*). Spelled-out fractions are hyphenated when used as adjectives (*two-thirds, one-fourth, three-fifths*, but *thirty-one hundredths*) but open when used as nouns. Colors in which the first word modifies the second are left open (*blue gray, reddish orange, coal black*).

When *Not* to Use Hyphens

Most prefixes are joined to roots without the use of a hyphen. These prefixes include *ante-, anti-, bi-, co-, contra-, counter-, de-, extra-, infra-, inter-, intra-, micro-, mid-, non-, over-, pre-, post-, pro-, pseudo-, re-, semi-, sub-, super-, supra-, trans-, tri-, ultra-, un-*, and *under-*. This rule is most frequently abused with the prefixes *non-* and *un-* for some reason. Don't fall prey to this mistake. Hyphens may be used to avoid misreading or mispronouncing and if the prefix is followed by a proper noun, an abbreviation, or a phrase.

The following suffixes are not preceded by a hyphen unless it would create an awkward combination of repetitive letters: *-fold, -hood, -less, -like, -wise*.

The above discussion does not cover every use of the hyphen, of course, but if you focus on these uses of the hyphen, you'll get most of your hyphen uses correct.

One Final Tip

You can use a PubMed search to determine whether a compound is closed, open, or hyphenated. See Georgia Green's article in this issue, "The Best Things in Life Are Free: How to Use Medical Journal Abstracts."

Quick Reference

Here is a list of compound words that occur frequently in medical dictation. Although some references may show other forms of the following words, these are widely used and accepted. The plural form is indicated by means of parentheses.

afterload (adj.)
amino acid level(s) (noun)
bachelor's degree (noun)
basal cell carcinoma (noun)
bed rest (noun)
birth control method(s) (noun)
blood-brain barrier (noun)
bone marrow biopsy (noun)
brother(s)-in-law (noun)
breast-feeding (noun or adj.)
check up (verb)
checkup(s) (noun)
chickenpox (noun)
cogwheel (adj.)
dipstick (noun or adj.)
downgoing (adj.)
eardrum (noun)
end-expiratory pressure (noun)
eye drops (noun)
father figure (noun)
fiberoptic (adj.)
fingerbreadth(s) (noun)
fingerstick(s) (noun)
follow through (verb)
followthrough (noun)
follow up (verb)
followup, or follow-up (noun, adj.)
footdrop (noun)
foster child (noun)
gallbladder (noun)
gallstone(s) (noun)
grandchild (noun)
grand mal seizure(s) (noun)
grandparent (noun)
great-grandson (noun)
headache (noun)
healthcare (noun, adj.) (AHDI, AHIMA)
health care (noun) (AMWA, AMA)
health-care (adj.) (AMWA, AMA)
herpesvirus (noun)
hyaline membrane disease (noun)
Lake-Sumter Community College (two counties) (noun)
lightheaded (adj.)
lightheadedneess (noun)
long-suffering (adj.)
matter-of-fact (adj.)
nail bed (noun)
nonweightbearing (adj.)
nose drops (noun)
physician(s) of record (noun)
piggyback (adj.)
pursestring (noun)
Seminole Community College (noun)
sickle cell disease (noun)
sickle cell trait (noun)
small-cell carcinoma (noun)
social service agency (noun)
stick-tie (noun)
stomachache (noun)
surgeon general (noun)
symptom-free (adj.)
tablespoonful(s) (noun)
teaspoonful(s) (noun)
third-spacing (noun)
toothache (noun)
unselfconscious (adj.)
up-to-date (adj.)
urinary tract infection (noun)
weightbearing (adj.)
zigzag (adj.)

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1 MT Tools CE credit approved

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Hyphen Exercise

Instructions: Insert hyphens where you think they belong. Be able to explain your reasons!

1. This youngish, twenty odd year old female was admitted in acute distress.
2. The patient claims to have followed an 800 calorie diet for a 3 month period but with no weight loss.
3. I recommended a high fiber diet.
4. A 3 cm incision was made over the 7th rib.
5. He is to use his thigh length T.E.D. hose on his left lower extremity.
6. The albumin globulin ratio was 4.5 over 1.5 or 3.0.
7. X rays of the abdomen showed small air fluid levels and one dilated loop of small bowel.
8. The patient is a 28 year old African American male admitted with an infected human bite on the right hand.
9. IMPRESSION: Right sided pleural effusion, most likely on the basis of congestive heart failure.
10. There is a grade 2 to 3 low pitched aortic ejection systolic murmur heard best during expiration.
11. The subject is a normally developed and somewhat overweight white male.
12. In 8 weeks, we will do the full blown treadmill stress test, and based on that will make the final modification of his exercise program.
13. A clean voided urine showed 15 to 20 white blood cells per high power field, 8 to 10 red cells, 4+ occult blood, 1+ protein, negative for sugar, pH 5.5.
14. Fine needle aspiration revealed well differentiated small cell carcinoma.
15. NPH and regular insulin will be given on a split dose b.i.d. dosing regimen.
16. This is a 19 year old female college student who is seen with reference to vulvar pain and urinary burning of 2 to 2 1/2 days' duration.
17. Her heavy bleeding decreased the hematocrit to the 26% to 28% range.
18. The patient is a para 3, 2 0 1 2, Rh negative woman in her 36th week of pregnancy.
19. The patient was thought to have infected eczema or gram negative toe web infection.
20. GENERAL: Well developed, well nourished, English speaking Caucasian 17 year old.
21. Extremity exam reveals blistering cellulitis over the dorsum of the foot with swelling and extension of the abnormal coloration to the mid pretibial area.
22. The lower lip is still denuded and shows some granulation tissue where it had been deepithelialized by the disease.
23. On her right mid lower back, she has a medium brown, clinically benign, sharply marginated, evenly colored nevus, dermal in character, with normal skin lines.
24. The patient complains of a 2 to 3 week history of cough, with yellow phlegm for 2 days and emesis and abdominal pain the day prior to admission.
25. One half of the clips were removed today; the remainder will be removed in a couple of days at her 1st office visit.

Hyphen Exercise Answers

1. This youngish, 20-odd-year-old female was admitted in acute distress.
2. The patient claims to have followed an 800-calorie diet for a 3-month period but with no weight loss.
3. I recommended a high-fiber diet.
4. A 3 cm incision was made over the 7th rib.

   Note: The people behind the SI metric system have determined that there should be no punctuation used with metric units of measure; they even use a half space in place of commas in large numbers. English units of measure, such as 1-inch scar, will continue to be hyphenated, however.
5. He is to use his thigh-length T.E.D. hose on his left lower extremity.
6. The albumin-globulin ratio was 4.5 over 1.5 or 3.0.

   Note: You would not use a slash for *4.5/1.5* because of the decimals and because of the *or 3.0*.
7. X-rays of the abdomen showed small air-fluid levels and one dilated loop of small bowel.
8. The patient is a 28-year-old African American male admitted with an infected human bite on the right hand.
9. IMPRESSION: Right-sided pleural effusion, most likely on the basis of congestive heart failure.
10. There is a grade 2 to 3 low-pitched aortic ejection systolic murmur heard best during expiration.
11. The subject is a normally developed and somewhat overweight white male.
12. In 8 weeks, we will do the full-blown treadmill stress test and, based on that, will make the final modification of his exercise program.
13. A clean-voided urine showed 15 to 20 [15-20] white blood cells per high-power field, 8 to 10 [8-10] red cells, 4+ occult blood, 1+ protein, negative for sugar, pH 5.5.

    Note: *High-power* (not *high-powered*) is an adjective-noun compound.
14. Fine-needle aspiration revealed well-differentiated small-cell carcinoma.
15. NPH and regular insulin will be given on a split-dose b.i.d. dosing regimen.
16. This is a 19-year-old female college student who is seen with reference to vulvar pain and urinary burning of 2 to 2-1/2 days' duration.

    Note: You would not put *2-2-1/2 days* because you don't want double hyphens.
17. Her heavy bleeding decreased the hematocrit to the 26% to 28% range.

    Note: According to *The Book of Style for Medical Transcription*, the percent sign should be used with each number, and hyphens are not used with % signs.
18. The patient is a para 3, 2-0-1-2, Rh-negative woman in her 36th week of pregnancy.
19. The patient was thought to have infected eczema or gram-negative toe web infection.

    Note: *Toe web infection* is a disease entity, so do not hyphenate *toe web*.
20. GENERAL: Well-developed, well-nourished, English-speaking Caucasian 17-year-old.
21. Extremity exam reveals blistering cellulitis over the dorsum of the foot with swelling and extension of the abnormal coloration to the mid-pretibial area.

    Note: Although *mid* can sometimes be used alone as a word, I would hyphenate *mid* here because it modifies the phrase *pretibial area*.
22. The lower lip is still denuded and shows some granulation tissue where it had been de-epithelialized by the disease.

    Note: Although the trend is to omit hyphens between doubled vowels, I think *deepithelialized* would be more difficult to read without the hyphen.
23. On her right mid lower back, she has a medium-brown, clinically benign, sharply marginated, evenly colored nevus, dermal in character, with normal skin lines.
24. The patient complains of a 2- to 3-week history of cough, with yellow phlegm for 2 days and emesis and abdominal pain the day prior to admission.

    Note: This is an example of a suspensive hyphen; it represents a 2-week to 3-week history.
25. One half of the clips were removed today; the remainder will be removed in a couple of days at her first office visit.

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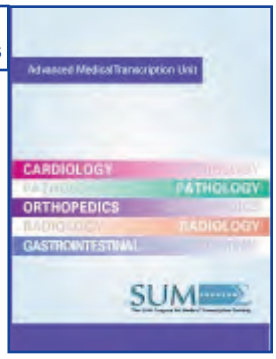

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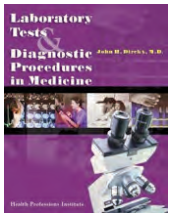

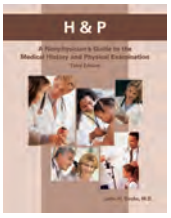

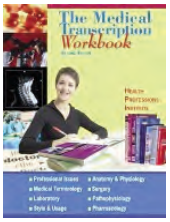

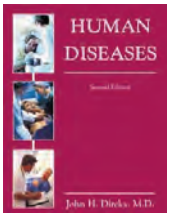

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What's New in Medicine

Allerslit forte—a high-dose sublingual grass pollen preparation used to treat symptoms of allergy, rhinitis, and conjunctivitis.

Amplatzer muscular VSD occluder—a device placed via a catheter into the muscular ventricular septum in order to close a ventricular septal defect (VSD). In the majority of patients, the implant will permanently close the defect in the heart without open-heart surgery.

Architect Core-M—a lab blood test used to detect antibodies associated with hepatitis B infection.

Arglaes powder—a topical antimicrobial used for negative-pressure wound therapy.

Avastin (bevacizumab)—a drug recently approved, in combination with paclitaxel, for use in treating metastatic breast cancer. It is believed to increase the time the cancer is kept under control and offer a biologic option to women who previously were limited to chemotherapy alone.

AVNRT (atrioventricular nodal reentrant tachycardia).

Binax Now malaria test—a rapid laboratory antigen test used for detection and identification of the parasites that cause malaria.

cell-enhanced reconstruction—a procedure using adipose-derived stem and regenerative cells with additional adipose tissue for breast reconstruction following partial mastectomy.

Cervarix—a cervical cancer vaccine that shows high levels of protection for up to 6.4 years.

Chariker-Jeter wound drainage kit—a negative-pressure wound drainage kit that makes use of nonadherent, antimicrobial impregnated gauze.

cIAI (complicated intra-abdominal infections).

circumferential pulmonary vein ablation (CPVA)—used to treat paroxysmal atrial fibrillation.

COACH (Coordinating study evaluating Outcomes of Advising and Counseling in Heart failure) trial.

Cordis Enterprise vascular reconstruction device—a self-expanding stent and delivery system used with embolic coils for the treatment of wide-neck, intracranial, saccular or fusiform aneurysms.

Cormet hip resurfacing system—a metal-on-metal resurfacing artificial hip replacement system, surgically implanted to replace a hip joint. It is called a resurfacing prosthesis because only the surface of the femoral head (ball) is removed to implant the femoral head resurfacing component.

CryoCor cryoablation system.

cSSSI (complicated skin and skin structure infections). See *Tygacil*.

donor white blood cell infusion—used in treating patients with metastatic or unresectable cancer.

DP-CAR (distal pancreatectomy with en bloc celiac axis resection)—a recommended treatment for less advanced carcinoma.

Embeda—a pharmacological abuse-deterrent, extended-release morphine drug. It is an opioid medicine incorporating an abuse-deterrent feature while effectively treating patients with chronic pain.

Endeavor stent—a drug-eluting coronary stent on an over-the-wire delivery system. It is a tiny, expandable, mesh-like tube made of a cobalt-based metal with the drug contained within a thin polymer coating on its surface. The stent is mounted over a deflated balloon attached to the end of a long thin flexible tube called a stent delivery catheter.

endoglin—a plasma biomarker that may help to predict the spread of prostate cancer to regional lymph nodes.

endovascular vein harvesting (EVH)—endoscopic removal of a leg vein for use as a graft in cardiac bypass surgery. The surgeons use an endoscopic system with a small video camera to remove the vein through a tiny incision near the patient's knee. A surgeon makes 1-3 small incisions, each about 1-2 inches long, then inserts the long, narrow instruments system into the small incisions. The camera projects the image of the inside of the patient's leg onto a TV monitor, helping the surgical team remove the vein. After the vein has been separated from surrounding tissue, the system is used to pull the vein out. The vein is then used as a graft to bypass the blocked artery.

Entereg (alvimopan)—the first in a new class of drugs known as peripherally-acting mu opioid receptor antagonists used for the management of postoperative ileus by accelerating time to recovery of GI function following abdominal or pelvic surgeries.

Epicel cultured epidermal autografts (CEAs)—skin grafts that are sheets of autologous keratinocytes (skin cells) used to replace the epidermal layer of skin on severely burned patients. The patient's own skin cells are grown or cultured from a postage stamp-sized sample of the patient's own healthy skin.

EPITHET (Echoplanar Imaging Thrombolytic Evaluation Trial).

expanded endonasal approach (EEA)—a minimally invasive neurosurgical technique that gives surgeons access to the base of the skull,

Update

central brain, and top of the spinal cord by operating through the nose and nasal sinuses. EEA treats once inoperable or hard-to-reach tumors, blood vessel problems, and other conditions in critical areas of the brain, skull base, and spine, typically leaving no scars and fewer, if any, lingering side-effects than traditional craniofacial surgery. Patients can often be discharged within two days. Some procedures require only overnight stays. Also called *endoscopic transnasal brain surgery*.

Exponent stent—a self-expanding carotid stent with over-the-wire delivery system.

FAST (focused assessment with sonography in trauma) **protocol**.

FISH (femoral introducer sheath and hemostasis) **device**—a closure patch used to seal a hole in the femoral artery. It is used to stop bleeding at a puncture site following a catheterization.

fish odor syndrome—a rare genetic condition called trimethylaminuria which causes severe body "fishy" odor. The condition is a recessive inborn error of metabolism. The genetic defect involves an enzyme that breaks down trimethylamine, a byproduct of protein digestion released by bacteria living in the intestines. The diagnosis is made clinically but confirmed by complicated testing of the urine for elevated trimethylamine levels. It can be improved and controlled by a low-protein diet that restricts foods containing choline or trimethylamine oxide.

FLAIR endovascular stent graft—an endovascular system used to treat a stenosis at the venous anastomoses of an A-V access graft.

FLAT (first line ablation therapy)—for treatment of paroxysmal atrial fibrillation. The pulmonary veins are encircled with radiofrequency ablation, using NaviStar ThermoCool catheter and the Carto EP navigation system.

FTIR (Fourier transform infrared)—3-D multivariant image maps of tissue sections.

GeneSearch BLN Test Kit—a qualitative in vitro diagnostic test for the rapid detection of metastases larger than 0.2 mm in nodal tissue removed from sentinel lymph node biopsies of breast cancer patients.

half-top-hat (HTH) **configuration**—in penetrating keratoplasty (PKP).

Infusion Lipolysis—see *Lipidoctor Mini-Lipo*.

Kremlin wound drainage kit—uses impregnated gauze.

laparoscopic distal pancreatic resection—successfully used to treat solid and cystic tumors of the distal pancreas.

Lipidoctor Mini-Lipo—a limited tumescent liposuction procedure combined with Infusion Lipolysis (a proprietary product). The Mini-Lipo takes 1 to 1-1/2 hours which removes about half the fat of traditional liposuction. The Infusion Lipolysis is then injected to shrink the remaining fat cells and overlying skin over the following months. During the procedure, with the patient fully awake, sterile fluid containing local anesthesia and medication that breaks down fat is injected into the problem area. Then the process is reversed; fluid and fat are slowly and gently removed with a syringe and fine cannula. In subsequent months the patient massages transdermal creams into the treated area every day at home. They contain medications that are said to promote a high rate of fat breakdown, tighten the overlying skin, and block new fat accumulation.

milnacipran—a dual-reuptake inhibitor for the treatment of fibromyalgia syndrome.

Mitroflow aortic pericardial heart valve—a prosthetic heart valve made from bovine pericardium. It is used for the replacement of diseased, damaged, or malfunctioning native or prosthetic aortic valves.

Monolisa anti-HBc IgM EIA—a lab test used to detect antibodies associated with hepatitis B (HBV) infection.

Multi Exchange II (MX2) **stent delivery system**.

Mynx VCS—a vascular closure system designed to seal a puncture site in the femoral artery and stop the bleeding after a cardiac catheterization procedure. The Mynx VCS uses a balloon catheter and a standard procedural sheath to deliver an extravascular, hydrogel sealant used to seal the puncture site.

nanotechnology terms

atomic force microscope (AFM)
"biobot"
biomotor
carbon nanotube
dendrimer
"flesh welder"
lipid-based nanoparticle system
molecular beam epitaxy
molecular assemblers
nanoart
nanobots
nanodevices
nanoengineers
nanofilter
nanogram
nanolithography
nanomachines
nanomaterials
nanomedical
nanomedicine
nanometer
nanomole
nanomotors
nanonephrology
nanoparticles
nanopores

Update

nanorobotics
nanorobots
nanoscale
nanoscale artificial kidney
nanoshells
nanosieve
nanostructures
nanotechnician
nanotube
nanotubules
nanotweezers
neuroelectronic interfacing
photodynamic therapy
polymer-based nanoparticle system
positional assembly
quantum dot (Qdot)
robotic molecular assembler
scanning acoustic microscope (SAM)
scanning tunneling microscope (STM)

NaviStar ThermoCool irrigated-tip catheter—approved for treating patients with type I atrial flutter and drug refractory ventricular tachycardia for myocardial infarction patients. The catheter is approved for use in Europe for endocardial ablation for treating cardiac arrhythmias.

NexGen LPS-flex mobile and **LPS-mobile bearing knees**—artificial mobile bearing knee systems that are designed to replace the knee joint.

Novation ceramic articulation hip system—an alumina ceramic artificial hip replacement system, surgically implanted to completely replace a diseased or damaged hip joint.

patch and plug repair—a technique to repair groin hernias. The procedure uses mesh to fix the rupture and can be done safely through a 2-inch incision under local anesthesia and allows for a rapid return to normal activities. Other types of repair include laparoscopic repair which can have a higher rate of recurrence and a technique known as "myofascial flap." These types require general anesthesia.

PhotoSilk Plus pulsed light system—a laser system used in aesthetic therapies, including skin rejuvenation, hair removal, and removal of pigmented lesions and the blush of rosacea.

phalloplasty—surgical treatment for enlarging a micropenis (less than 2 inches in length). In the procedure a flap of skin is taken from the patient's forearm and shaped into a penis. The original penis is incorporated into the surface of the transplanted skin to maintain erogenous sensation A urethra is added for urination, and an inflatable penile prosthesis allows for an erection.

Pinnacle hip replacement products.

Prestige cervical disk system—used to replace a cervical disk from C3-C7 following removal of the disk for intractable radiculopathy and/or myelopathy.

Prochymal—an adult stem cell product that has received approval by the FDA as an orphan drug product for the treatment of graft-versus-host disease (GVHD).

ProDisc-C total disc replacement—a device made from metal and plastic that is placed between two adjacent vertebral bodies (neck bones) to replace a diseased cervical disc. It is used in skeletally mature patients for reconstruction of the disc from C3-C7 following removal of the disc at one level for intractable symptomatic cervical disc disease (SCDD).

Proellex—a selective progesterone-receptor modulator (SPRM, antiprogestin) investigated for the treatment of endometriosis and uterine fibroids.

Promacta (eltrombopag)—an oral, nonpeptide platelet growth factor that induces the proliferation and differentiation of cells to produce platelets. While other drugs that restore normal platelet functions are infusions or injections, eltrombopag is a once-a-day pill. It is very promising in treating patients with hepatitis C having a low blood platelet count.

psychoneuroimmunology—a new field using stress reduction treatment that may prevent cancer cells from taking root again.

RALP (robot-assisted laparoscopic prostatectomy).

Rapid Exchange (RX) **stent delivery system.**

Realize band—a surgically implanted adjustable gastric device for weight loss in severely obese adults. The Realize band consists of a silicone band, tubing, and an injection port. It is placed around the upper part of the stomach, creating a small stomach pouch that can hold only a small amount of food.

RNFL (retinal nerve fiber layer).

r-TMS (repetitive transcranial stimulation) for Parkinson disease.

Sabril (vigabatrin)—used as a monotherapy for patients with infantile spasms and as adjunctive treatment for adults with refractory complex partial seizures.

SCDD (symptomatic cervical disk disease).

segmental pulmonary vein ablation—an interventional ablation approach in treating paroxysmal atrial fibrillation. It includes either empiric isolation of all pulmonary veins or segmental isolation of only the arrhythmogenic pulmonary veins.

Sepet liver assist device—an extracorporeal artificial liver assist device for blood purification of chronically ill patients suffering from acute liver failure. It is a sterile, disposable cartridge containing microporous hollow fibers with proprietary permeability characteristics. It may be used with standard blood dialysis systems available in hospital intensive care units.

Update

SilvaSorb amorphous hydrogel—a topical antimicrobial used for negative-pressure wound therapy.

single-incision cholecystectomy—removal of the gallbladder through a single ½-inch incision through the navel, instead of the usual 4 incisions on the abdomen. Less scarring and a faster recovery time are advantages of the single-incision procedure.

snap-on teeth—plastic teeth that slide over a patient's own teeth like a glove and snap into place. They are used for purely cosmetic purposes; they do not replace the need for bridgework or fillings. They cost about $1000 to $1500 and can be worn when eating soft foods.

sodium stibogluconate combined with interferon alfa-2b—used in the treatment of patients with advanced cancer that has not responded to standard treatment or where there is no standard treatment for this type of cancer.

sugammadex—the first in a new class of drugs known as selective relaxant binding agents designed to reverse the effects of certain muscle relaxants used in general anesthesia. It works in an entirely new and unique way to encapsulate the muscle relaxant molecule and render it inactive.

surgical ventricular restoration (SVR)—a procedure in which surgeons cut open the left ventricle and sew it back together—without actually removing any tissue—to more closely resemble a smaller, normally shaped heart. Often, a patch is sewn over the cut areas to hold the newly shaped heart together. SVR is used in combination with CABG surgery for a better outcome in patients with advanced heart failure. Remodeling the heart can restore the heart to its normal, elliptical shape, lowering the pressure buildup inside the heart cavity, reducing the amount of oxygen and energy needed by the muscle to keep pumping, and allowing the heart to work normally.

TACT (tuned-aperture computed tomography)—3-D mammography which allows radiologists to see tumors within the dense part of the breasts or other regions that otherwise might be obscured by overlying tissues. In mammography, it is used to produce a series of electronic "slices" to look at each portion of the breast in greater detail. TACT reconstructs a 3-D image from a series of 2-D images made from x-rays, nuclear medicine, or even light as seen by a conventional camera.

telavancin—a bactericidal, once-daily injectable antibiotic proposed to treat complicated skin and skin structure infections (cSSSI) caused by gram-positive bacteria, including resistant pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA).

thalidomide and topotecan—combination chemotherapy considered a safe and effective treatment for women with recurrent ovarian cancer.

3M Cavilon No Sting Barrier Film—a skin prep or barrier wipe that is used under the drape after wound cleansing.

TILK ("tuck in" lamellar keratoplasty) (Oph)—a procedure for corneal ectasias involving corneal periphery.

TIPPS (transilluminated powered phlebectomy)—a minimally invasive procedure using smaller and fewer skin incisions to remove varicose veins. The veins are removed using a small telescope-like device. It is said to result in less pain, improved cosmetic results, decreased incisions, decreased operating room time, and minimal complications.

Treanda (bendamustine HCl)—an injection for the treatment of patients with indolent B-cell non-Hodgkin's lymphoma who have progressed during or following treatment with rituximab or a rituximab-containing regimen.

Tri-Lock bone preservation stem—a new tapered-wedge titanium stem that minimizes the amount of bone that needs to be removed during hip replacement surgery, while promoting stability, preserving the natural anatomy and restoring hip function.

trimethylaminuria—see *fish odor syndrome*.

Tygacil (tigecycline)—an IV antibiotic with a broad spectrum of antimicrobial activity, including activity against the drug-resistant bacteria methicillin-resistant *Staphylococcus aureus* (MRSA). Tygacil is used for the treatment of complicated intra-abdominal infections and complicated skin and skin structure infections in adults.

UHR (ultrahigh-resolution) **optical coherence tomography**—for detection of retinal nerve fiber layer loss in eyes with band atrophy of the optic nerve.

UltraShape—a device that offers a noninvasive fat reduction and body contouring solution for men and women that uses nonthermal, selective, focused ultrasound to break down stubborn fat deposits. The machine is computerized and delivers a uniform ultrasound pulse over the treatment area, which lasts about 90 minutes. The energy is aimed at the fat cells in a certain area. The released fat is then recycled by the body.

Wooding-Scott drainage/irrigation kit—a negative-pressure wound drainage system that uses antimicrobial gauze.

xTAG respiratory viral panel (RVP) **assay**—a device that can simultaneously detect and identify nucleic acids of multiple respiratory viruses in nasopharyngeal swab specimens from individuals suspected of respiratory tract infections.