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Anthony P. Salvador

Western Michigan University, asalvador85@gmail.com

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THE FOUNDATION, EDUCATION, AND PRACTICE OF
OSTEOPATHIC MEDICINE

Anthony P. Salvador
Lee Honors College
Western Michigan University
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ABSTRACT

Osteopathic medicine has quickly grown into a successful and respectable branch of medical practice. It was created out of a necessity for change in the late 1800s, and continues to be a credible form of alternative medicine. After reviewing literary material, journal articles, and numerous osteopathic college sources it was seen that osteopathic medicine can be practiced in numerous settings and will become integral in the near future due to the shortage of physicians in the United States. Today, osteopaths work closely with all types of medical personal including medical doctors.

THE OSTEOPATHIC HISTORY

When a current system is failing a needful population, something drastic must take place. At the turn of the twentieth century modern medications, surgery, and other therapies were causing more harm than good to patients, and one frontier physician set out to change the way medicine was practiced. Andrew Taylor Still, M.D., D.O. was the third of nine children born to a Methodist minister in Jonesville, VA on August 6, 1828 [1]. The westward march of the mid-1800s caused the Methodist Church to migrate further west while putting enormous pressure on its ministers and their families. The constant moves and lack of consistency caused Still to sometimes forgo a formal education, and when Still's father was transferred to a Native American reservation in Kansas he stayed behind to care for his family. Soon after, Still joined his mother and father in Kansas. During this time, Still had finally decided that a career in medicine was the thing that had been eluding him for some time. Shortly after arriving in the new territories, the outbreak of the Civil War changed the way that Still would forever look at the medical profession.

Prior to the Civil War, many physicians had never attended any formal medical school but served as apprentices under an informal preceptor [1]. However, it became a common practice for students to attend a short four to six month stay in small, unregulated medical schools that were slowly popping up all around the country. This period supplemented the apprenticeship with formal lectures and labs and provided a slightly stronger foundation for the public medical practice. Following the standard Still continued his medical education by studying various anatomical and physiological texts along with an apprenticeship under his father who, in addition to serving the church, had begun to practice medicine. The patients on which Still first practiced were the Shawnee Indians from the reservation where his father was stationed by the church [1]. With his medical “training” in place, Still set out to serve as a field surgeon in the Civil War. Here, he treated the critically injured soldiers with the common medical methods that he had learned during his short apprenticeship with his father. The Civil War served as a turning point for common medical practices as many physicians began to reject the empirical and barbaric ways of their predecessors [1]. The war also became a stepping-stone for new, and sometimes erratic, forms of alternative medicine such as bloodletting and magnetic healing. However, these practices were not of interest to Still, and finally, in 1874, he severed his ties with modern medicine completely [1].

Still’s severance was not well accepted by his community nor his extended family, who, on occasion, offered to ease his debt if would once again practice traditional medicine. With his family settled in Kirksville, MO, Still became a physician on foot in order to pay his debts and medical bills he had accrued following his bout with typhoid fever. Around this time, Still began to take a strong interest in bone setting, which, at the

time, was considered an orthopedic form of manipulative medicine. Bone setting was a more common practice overseas in England, but it had still not gained popularity in the United States [1]. However, there were claims that bonesetters could remedy diseases that modern medicine failed to even touch. Dr. Wharton Hood published a book in England in which he described the conditions for which bone setting was appropriate: “cases of stiffness, pain, and adhesion following fractures and sprains of one or more of the bones forming a joint; rheumatic or gouty joints; displaced cartilage; subluxations of the bones of the carpus and tarsus; displaced tendons hysterical joints; and ganglionic swellings” [1]. Ultimately, Still became known as the “lightening bonesetter” during the late 1800s with many patients flocking to his now established practice in northeast Missouri. After some time in practice, Still needed to find the proper term for his medical practice, as it was a new breed that combined practices from various other fields of medicine. In 1889, he finally coined the term “osteopathy” to describe his new, and highly sought after, medical practice [1].

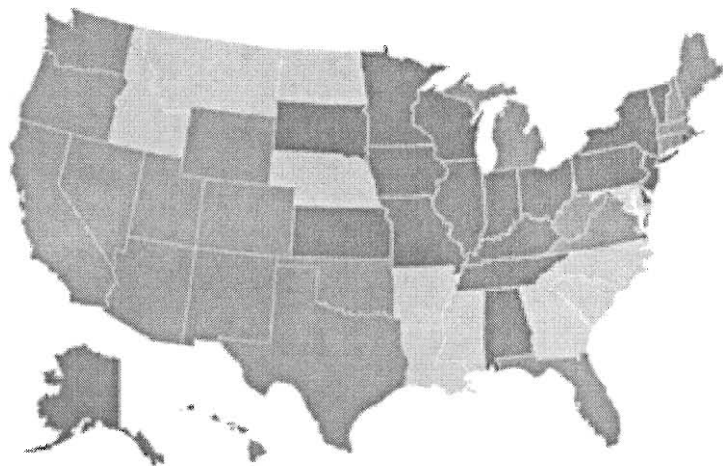
With the practice named, and his client base growing daily, Still wanted to establish a place where he could educate others on the practice of osteopathy. In 1892, he opened the American School of Osteopathy in Kirksville, MO where he charged students upwards of 500 dollars for their formal education [1]. While Still was a natural philosopher, he also required help from a classically trained Scottish physician named Dr. William Smith. A fabulous professor and even more well coached anatomist, Smith lectured to the students daily on human anatomy with great success. However, the students were also required to attend afternoon sessions led by Dr. Still. He used various metaphors to describe bodily functions that were difficult to follow, such as the following:

Suppose in far distant California there is a colony of people depending upon your coming in person with a load of produce to keep them from starving. You load your car with everything necessary to sustain life and start off in the right direction. So far so good. But in case you are sidetracked somewhere, and so long delayed in reaching the desired point that your stock of provision is spoiled. If complete starvation is not the result, your friends will be at least poorly nourished. So if the supply channels of the body be obstructed, and the life-giving currents do not reach their destination full freighted with health corpuscles, then disease sets in. [1]

While his lectures were informative, Still also demonstrated his techniques on the patients who visited the clinic. He would explain to the students the reason for each manipulation, and he would give insight as to why the body was reacting in the way it was. Due to the strong support of the community, and the patients' commitment for a one-month stay in Kirksville, students got to watch the progression of patients after many visits to the school and clinic [1]. This interaction with the community would lay the foundation for an important osteopathic principle: supporting underserved and needful populations.

In the years following the establishment of the American School of Osteopathy, legal and community struggles plagued the osteopathic profession. Other osteopathic schools began to pop-up around the country, and a number of osteopathic physicians set up practices in every possible setting: urban, rural, and also among their accepted Medical Doctor counterparts. Although national legislature was difficult to obtain for the DOs, individual states began granting licensing rights to osteopaths in 1901. Many states were reluctant to grant privileges to osteopaths due to pressure from legislators and many of the established medical societies such as the American Medical Association (AMA). It was widely published that the AMA spent millions of dollars in California during the 1960s in order to slow the progression of osteopathic medicine and put an end to the practice once

and for all. However, these uprisings, and others, were not successful and osteopathy continued to grow and spread until 1989 when Nebraska became the final state to approve licensure to DOs.



Years in which states passed laws granting DOs medical practice rights equal to MDs.

1901-1930 1931-1966 1967-1989

Courtesy: *Gevitz, Norman [1]*

While osteopaths were attempting to gain recognition within individual states, a battle was taking place at the national level. Prior to the 1960s DOs were not capable of entering the United States Military Medical Corps, but in May 1966 Secretary of Defense Robert McNamara authorized the

acceptance of DOs [2]. Thirty years later, Ronald Blank, DO was appointed the Surgeon General of the Army. With the continued success and acceptance of osteopaths around the country, certain principles and ideals specific to osteopathic medicine began to appear.

The most dangerous thing confronting DOs in the present day is the loss of a specific and historical identity. However, the osteopathic philosophy can be found on every website, course book, and admission packet that is published about osteopathic medicine. The Michigan State University College of Osteopathic Medicine defines these principles as:

- There exists an intimate relationship between structure and function in the human body.

- Within this unity of organization, health is a reflection of integrity of self-regulatory and self-healing mechanisms.
- Certain distortions within these components reflects a level of disturbed health as a part of the process of disease.
- Some manifestations of these distortions can be perceived within the neuromusculoskeletal systems through the clinical use of osteopathic diagnostic procedures.
- Osteopathic medicine is dedicated to the amelioration of these disturbed structure-function relationships by the clinical application of osteopathic diagnostic and therapeutic skills developed within this distinctive orientation.

These central ideas differ somewhat from college to college and facility to facility but the themes remain the same in most instances. The osteopathic principles that A.T. Still created in the nineteenth century defines the osteopathic medicine of today.

THE OSTEOPATHIC DIFFERENCE: WHAT SETS IT APART?

With two separate histories and identities, it would seem that DOs and MDs are extremely different. However, many sources, both critical and supportive, have deemed the division negligible. From the view of a medical student, the schooling, training, and professorships are identical as the basic sciences are taught in a scientific and research based method. Aside from osteopathic medical students undergoing specific training in the manipulative techniques prescribed by Still, “allopathic” and osteopathic students endure the same rigorous educational years.

Until the early 1960s the only barrier separating MDs and DOs in the United States was the right for unlimited practice in every state. Due to many obstacles erected by numerous organizations after the establishment of osteopathy many osteopathic physicians could not practice amongst their MD counterparts as stated in the previous section.

However, as practice rights were granted to DOs in every state, their popularity began to grow and more schools for educating future DOs were founded. In spite of this, many ideals still plagued DOs as they tried to grab a small piece of the American medical community. It had long been claimed that the role of osteopathic physicians was to care for populations that were underserved and unnoticed, which included rural communities.

This topic was fundamental in locations of extremely rural settlements, such as those where Still began his practice, and when insurance issues were not of particular interest.

This lack of interest was due to poor economic and socialistic conditions during not only westward expansion but also the downturn of the economy near the Great Depression.

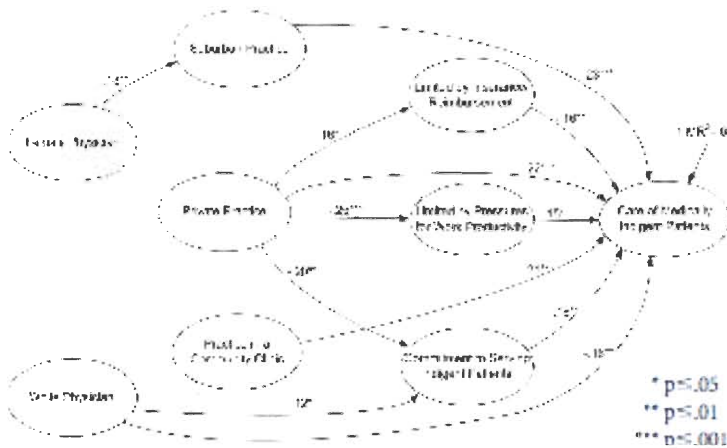
However, this theory of service still holds true in today's society as different groups of patients and populations are continually being added to demands of primary care physicians. A group studying medically indigent populations, i.e. Medicaid and uninsured patients, scratched the surface of the difference in service of "allopaths" and osteopaths.

With over 47 million uninsured non-elderly patients in 2006, the demand for care has become a large financial burden on practicing primary care physicians, both MD and DO

[3]. Due to a large percentage of osteopaths entering the primary care arena, they are responsible for much of this economically challenged population. Although there is no emerging research that supports DOs care for a larger number of indigent patients,

"Constraints to Caring: Service to Medically Indigent Patients by Allopathic and Osteopathic

Physicians" documented many statistical factors that contribute to serving a specific population. Namely among these were practice type (private versus public), location (rural versus urban), and medical specialty. Their results can be seen in the figure to the left with



Factors influencing care of indigent patients by osteopathic physicians.
 Courtesy: Chirayath and Wentworth [3]

correlative data and other statistical markers. In this same study, the researchers also found significant evidence that both MDs and DOs who have stronger feelings of working with indigent populations are more likely to do so. This research suggests a reason to believe that many osteopathic practitioners enter primary care

specialties due to the emphasis put on whole body healing.

When Dr. Still founded osteopathic medicine, his intention was to provide relief and cure many diseases via the musculoskeletal system [A]. Today, osteopathic physicians uphold this ideal as they take a “whole person approach” to curing many ailing patients versus treating specific symptoms and/or diseases with which a patient may present. With muscles and bones accounting for nearly two-thirds of the body’s weight, osteopathic physicians take time to examine a patient’s structure while looking for possible dysfunctions [4]. DOs will use a patient’s body to their advantage because, according to osteopathic theory and belief, the body has a natural tendency to heal itself and work towards normal function [4]. Beyond treating a patient, DOs act as an educator to their patients, which is outlined by the AOA as:

In today's terms, DOs evaluate each patient's personal health risks-such as smoking, high blood pressure, excessive cholesterol levels, stress and other lifestyle factors. In coordination with prescribing appropriate medical treatment, osteopathic physicians act as teachers to help patients take more responsibility for their well-being and to change un-healthy patterns. [4]

The educational process accounts for life altering encounters that osteopathic physicians have with their patients and leads to the high percentage, nearly 65%, of osteopaths entering the primary care specialties (i.e. pediatrics, family practice, obstetrics and gynecology, and internal medicine) [5]. This topic is very important to the foundations of osteopathic medicine as they care for groups of people who are in need of significant medical attention.

In practice today, MDs and DOs are almost indistinguishable due to the advances in medical technologies. However, the strong osteopathic foundation created by A.T. Still remains in place especially in the educational process of osteopathic physicians.

MEDICAL EDUCATION

While it can be seen that osteopaths and allopaths practice in similar settings after their respective graduations, the schooling they obtain while in medical training colleges and facilities can differ slightly. The road that nearly all physicians, both MD and DO, take to get to the graduate level education of medical school is also nearly identical. Many matriculates possess a Bachelor's degree from a four-year institution with a majority of the curriculum revolving around the basic sciences, which include biology, chemistry, biochemistry, and physics. These classes are used to prepare for the medical college curriculum and also the Medical College Admissions Test (MCAT). The MCAT is taken by both MD and DO applicants, and it is used to compare applicants coming from a

variety of undergraduate institutions. The MCAT is broken into four sections: Physical Sciences, Verbal Reasoning, Writing, and Biological Sciences. The Physical Sciences section covers topics related to physics and inorganic, or general, chemistry, while the Biological Sciences section includes the topics of biology and organic chemistry. The science sections and verbal reasoning contain blocks of questions that follow passages, which, excluding the verbal reasoning section, require extensive background knowledge of the basic sciences. The writing section includes two thirty-minute essays that can range across a broad spectrum of topics. Each section is given a scaled score; the sciences and verbal are scored 1-15 while the writing is scored J-T. Following the completion of the MCAT, many DO and MD applicants ready themselves for the application process.

The process of applying to medical school involves two primary sources: AACOMAS for DO applicants and AMCAS for MD applicants. Both of these services provide a way to compile the multiple facets that are involved in a medical school primary application such as education, employment, volunteer experience, and research experience. Once transcripts and scores have been received from the applicant, the services pass the information on to the list of medical schools that the applicant has specified on his or her application. As each school receives the primary application, applicants are reviewed and offered a secondary application, which usually include essays, records of nonacademic experiences, and letters of recommendation. Some schools use the traditional postal mail method of years past, but others have developed online systems that have streamlined the entire process. At this point, secondary applications are reviewed and a select few applicants are targeted for interviews. These interviews usually take place on the campus of the medical school and can vary in length and organization. A number of

interviewed applicants are then selected for admission to the medical school where they begin their medical education.

Medical school is where the education begins to differ for MD and DO students as they start their basic science curriculum. The main difference in structure is due to the addition of osteopathic manipulative medicine in the osteopathic curriculum. The length and frequency of this training varies from school to school but is a commonality between all osteopathic medical schools. In contrast to this, most osteopathic and allopathic medical schools provide the same basic science education for their students. At Michigan State University, MD and DO medical students attend some classes, such as Medical Biochemistry and Genetics, together. Examples of medical school curricula can be found in Appendix B and are courtesy of the Michigan State University College of Osteopathic Medicine and The University of Michigan School of Medicine [B].

During their medical education, medical students must take and pass licensing exams. Osteopathic medical students typically take the COMLEX, which is separated into three phases: Level 1, Level 2, and Level 3. The Level 1 exam is usually taken after the first year of medical school, and it “emphasizes the scientific concepts and principles necessary for understanding the mechanisms of health, medical problems and disease processes” [6]. The level 2 exam is separated into two components: the Cognitive Evaluation and the Performance Evaluation, and it is administered after the second year of medical education. The Level 2 Cognitive Evaluation “emphasizes the medical concepts and principles necessary for making appropriate medical diagnoses through patient history and physical examination findings” [6]. In conjunction, the Level 2 Performance Evaluation is “a one-day examination of clinical skills where each candidate will

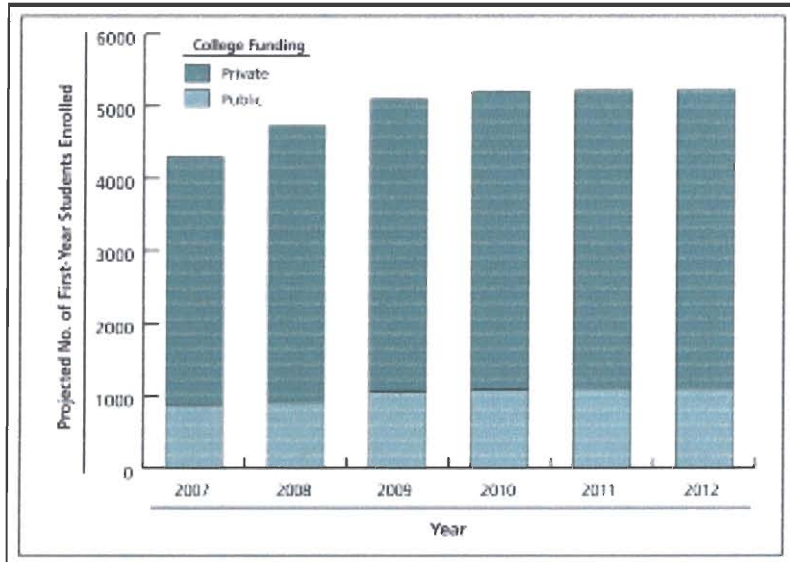
encounter twelve standardized patients over the course of a seven-hour examination day” [6]. Lastly, the Level 3 exam is given after medical school graduation and the “candidates are expected to demonstrate knowledge of clinical concepts and principles necessary for solving medical problems as independently practicing osteopathic generalist physicians” [6]. Once these three stages are passed, an osteopathic graduate usually moves onto an approved internship position and/or residency. Most residencies last anywhere from three to five years and allow the graduate to become proficient in a medical specialty such as pediatrics, cardiology, radiology, emergency medicine, and family practice, among many others.

The licensing exams for medical doctors are very similar to the three step COMLEX, but it goes by a different name: the USMLE. It is administered at the same intervals as the COMLEX, and it serves to prepare graduates for MD residencies [7]. Osteopathic medical students are able to take both examinations, and some choose to do so in order to apply for specific MD residencies. However, most osteopathic interns and medical students apply for AOA (American Osteopathic Association) residencies. These residencies are usually the same length as MD residencies and have the same content, but DO residencies are typically considered less prestigious [5]. In comparison, both MD and DO graduates receive the same education and the same clinical training following their medical education. A list of the institutions providing osteopathic schools of medicine can be found in the Appendix C.

THE FUTURE OF OSTEOPATHIC MEDICINE

The foundations of osteopathic medicine are quickly becoming blurred in the high

tech world of modern medicine. The shift in osteopathic medicine over the past few decades is due to the shift in the types of matriculants entering the schools. Many applicants view colleges of osteopathic medicine (COMs) as a great alternative if they did not get into their first choices for MD medical colleges [9]. With the change in the attitudes of medical students, many COMs shifted the way in which they taught the basic



Current enrollment projections for first-year osteopathic medical students at private and public colleges of osteopathic medicine.

Courtesy: Levitan, Thomas [8]

sciences. As hard science, such as research and pharmacology, began to emerge there was very little room for the radical methods of osteopathic manipulative medicine. This decrease in osteopathic education and the shift in attitudes of osteopathic practitioners were leading to an

overall identity decline [9]. While it is a good thing that osteopathic medical students are receiving a solid basic science background, it is concerning that the osteopathic identity is fading into the past. A solution proposed by Norman Gevitz, the foremost researcher on osteopathic medicine, is a rededication of the COMs to osteopathic principles and practices. The general notion is that in order to produce osteopathic physicians, osteopathic education must be distinct from all other medical education. This shift would involve better osteopathic teaching facilities and dedicated osteopathic educators who value the historical identity created for their profession. The money and students will be

plentiful as enrollment is expected to increase dramatically as the demand for physicians increases [9]. Lastly, the most important ideal is that of osteopathic manipulative medicine. This topic should be the cornerstone of osteopathic medical education as it is the cornerstone of the profession and osteopathic history. OMM needs to extend beyond the pre-clerkship years of medical school and into clerkships, internships, and residencies. A shift in identity will not occur unless the entire education of an osteopathic physician is changed and reverted to its foundations.

CONCLUSION

Osteopathic medicine was born out of necessity. During times when a great shift was needed in the way that medicine was practiced, A.T. Still created something above and beyond anything that was available. He taught that the body has the ability to heal itself and show symptoms of dysfunction and misalignment. Patrons began to see improvement as they visited his clinic and walked away cured of chronic and cumbersome diseases.

Osteopathic physicians have taken part in various fields of medicine and government, all the while struggling to gain practice rights in every corner of the United States. However, the efforts of the pioneer osteopathic physicians have led to numerous educational and practical opportunities for today's DOs. They are able to practice in rural, urban, and other settings, which help to serve many patients who would go unnoticed. They work in harmony with the medical community, including similarly trained MDs. Together, MDs and DOs help people on a daily basis, and although their training differs slightly, they both serve communities in admirable ways.

The most dangerous issue facing osteopaths today is the loss of their historical

identity. However, as the demand for physicians increases in the coming decade, osteopaths will play a crucial role in filling numerous voids in the American medical community.

ACKNOWLEDGEMENTS

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Appendices:

- [A] Stockard, Alan. "Competence Levels in Musculoskeletal Medicine: Comparison of Osteopathic and Allopathic Medical Graduates." *Journal of the American Osteopathic Association* 106(2006): 350-355.
- [B] Michigan State University College of Osteopathic Medicine, The University of Michigan School of Medicine
- [C] American Association of Colleges of Osteopathic Medicine

Table 1
Comparison of Osteopathic and Allopathic Graduates' Scores
on Freedman and Bernstein's Basic Competency Examination in Musculoskeletal Medicine*

Question	Answer [†]	Mean Score, %		COM Department(s) in Which Topic Could Be Taught
		COM Students	Allopathic Residents [‡]	
1. What common problem must all newborns be examined for?	Congenital dislocation of the hip <i>Also: congenital hip dysplasia, congenital dislocation of the hip, "CHD," dislocation, subluxation</i>	94	99	FM, O, P
2. What is a compartment syndrome?	Increased pressure in a closed fascial space	96	95	EM, FM, O, OMM, SM
3. Acute septic arthritis of the knee may be differentiated from inflammatory arthritis by which laboratory test?	Any analysis of fluid from aspiration: cell count, culture, Gram stain	73	76	EM, FM, IM, O, P, RH, SM
4. A patient dislocates his knee in a car accident. What structure(s) is/are at risk for injury and therefore must be evaluated?	Popliteal artery	34	70	A, EM, FM, O, SM
5. A patient punches his companion in the face and sustains a fracture of the fifth metacarpal and a 3-mm break in the skin over the fracture. What is the correct treatment, and why?	Irrigation and débridement because of risk of infection	37	54	EM, FM, O, SM
6. A patient comes to the office complaining of low-back pain that wakes him up from sleep. What two diagnoses are you concerned about?	Tumor and infection	32	33	FM, IM, O, OMM, RH, SM
7. How is compartment syndrome treated?	Fasciotomy <i>Also: surgery</i>	94	94	EM, FM, O, OMM, SM
8. A patient lands on his hand and is tender to palpation in the "snuff box" (ie, the space between the thumb extensor and abductor tendons). Initial radiographs do not show a fracture. What diagnosis must be considered?	Scaphoid fracture <i>Also: carpal bone fracture</i>	81	54	EM, FM, O, OMM, P, RD, SM
9. A 25-year-old male is involved in a motor vehicle accident. His left limb is in a position of flexion at the knee and hip, with internal rotation and adduction of the hip. What is the most likely diagnosis?	Hip dislocation	71	35	A, EM, FM, O, OMM, SM
10. What nerve is compressed in carpal tunnel syndrome?	Median nerve	96	94	A, EM, FM, N, O, OMM, RH, SM
11. A patient has a disc herniation pressing on the fifth lumbar nerve root. How is motor function of the fifth lumbar nerve root tested?	Dorsiflexion of the great toe <i>Also: toe extensors</i>	56	20	EM, FM, N, O, OMM, SM
12. How is motor function of the medial nerve tested in the hand?	Any median function: metacarpophalangeal finger flexion; thumb opposition, flexion, or abduction	69	75	EM, FM, N, O, OMM, RH, SM
13. A 12-year-old boy severely twists his ankle. Radiographs show only soft-tissue swelling. He is tender at the distal aspect of the fibula. What are two possible diagnoses?	Ligament sprain and Salter-Harris I fracture <i>Also: fracture, sprain</i>	73	67	EM, FM, O, OMM, P, RD, SM
14. A patient presents with new-onset low-back pain. Under what conditions are plain radiographs indicated? Please name five (eg, history of trauma).	Age ≤ 12 y or > 50 y; bowel or bladder changes; neurologic deficit; history of cancer, pregnancy, or drug or steroid use; systemic symptoms (eg, night pain, fever)	42	50	EM, FM, O, OMM, RD, SM

(continued)

Table 1 (continued)
Comparison of Osteopathic and Allopathic Graduates' Scores
on Freedman and Bernstein's Basic Competency Examination in Musculoskeletal Medicine*

Question	Answer†	Mean Score, %		COM Department(s) in Which Topic Could Be Taught
		COM Students	Allopathic Residents‡	
15. A patient has a displaced fracture near the fibular neck. What structure is at risk for injury?	Common peroneal nerve <i>Also: peroneal nerve</i>	67	62	A, EM, FM, N, O, OMM, SM
16. A 20-year-old injured his knee while playing football. You see him on the same day, and he has a knee effusion. An aspiration shows frank blood. What are the three most common diagnoses?	Ligament tear, fracture, and peripheral meniscal tear <i>Also: capsular tear, patellar dislocation</i>	72	44	EM, FM, O, SM
17. What are the five most common sources of cancer metastatic to bone?	Breast, prostate, lung, kidney, and thyroid	76	86	O, FM, IM, SM
18. Name two differences between rheumatoid arthritis and osteoarthritis.	Any two correct statements: inflammatory vs degenerative, proximal interphalangeal joint vs distal interphalangeal joint	88	76	O, FM, IM, RH, SM
19. Which malignancy may be present in bone yet typically is not detected with a bone scan?	Myeloma <i>Also: hematologic malignancies, leukemia, lymphoma</i>	33	51	FM, IM, O, P, SM
20. What is the function of the normal anterior cruciate ligament at the knee?	To prevent anterior displacement of the tibia on the femur	94	53	A, FM, O, OMM, SM
21. What is the difference between osteoporosis and osteomalacia?	Osteoporosis is decreased bone density; osteomalacia is decreased bone mineralization <i>Also: any true statement about epidemiology or pathophysiology (eg, estrogen vs vitamin D)</i>	55	40	FM, IM, O, RH, SM
22. In an elderly patient, displaced fractures of the femoral neck are typically treated with joint replacement, whereas fractures near the trochanter are treated with plates and screws. Why?	Blood supply to femoral head <i>Also: avascular necrosis, non-union</i>	71	40	A, EM, FM, O, SM
23. What muscle(s) is/are involved in lateral epicondylitis (tennis elbow)?	Wrist extensors <i>Also: any wrist extensor: extensor carpi radialis brevis, extensor carpi radialis longus, extensor digitorum communis</i>	37	18	EM, FM, O, OMM, P, RH, SM
24. Rupture of the biceps at the elbow results in weakness of both elbow flexion and [fill in the blank]?	Supination	35	49	A, EM, FM, O, OMM, SM
25. What muscle(s) control(s) external rotation of the humerus with the arm at the side?	Infraspinatus or teres minor <i>Also: rotator cuff</i>	62	28	A, EM, FM, O, OMM, P, SM

* The items are listed in order of the importance scores noted by Freedman and Bernstein.⁷
† All 25 answers are worth one point each. Partial credit is offered for questions 5, 6, 13, and 18 with half credit being allowed for either part of the correct answer (eg, treatment [irrigation and débridement] and explanation [risk of infection]). For question 16, though three answers are requested, full credit is offered for two correct responses. For questions 14 and 17, quarter credit is granted for each part of the correct answer (ie, "bladder changes" alone is worth a quarter point). In addition, for questions 14 and 17, though five answers are requested in the examination, full credit is granted for four correct responses.
Abbreviations: A indicates anatomy; COM, college of osteopathic medicine; EM, emergency medicine; FM, family medicine; IM, internal medicine; N, neurology; O, orthopedic surgery; OMM, osteopathic manipulative medicine; P, pediatrics; RD, radiology; RH, rheumatology; SM, sports medicine.
Adapted examination⁷ reprinted with permission from the authors and The Journal of Bone and Joint Surgery, Inc.

Pre-Clerkship Curriculum – COM Class of 2012 (rev: 6/17/08)		
This curriculum is subject to minor change		
<i>Note: Italics indicate basic science courses taught jointly with Human Medicine students</i>		
SEMESTER 1 – Summer 2008		
ANTR 551	6 credits	Medical Gross Anatomy
SEMESTER 2 – Fall 2008		
<i>BMB 514</i>	<i>3 credits</i>	<i>Medical Biochemistry</i>
<i>BMB 526</i>	<i>2 credits</i>	<i>Genetics</i>
<i>PSL 534</i>	<i>3 credits</i>	<i>Cell Biology and Physiology I</i>
OST 504	2 credits	Doctor/Patient Relationship
OST 531	2 credits	Biostatistics & Epidemiology
OMM 501	1 credit	Osteopathic Manipulative Medicine I
SEMESTER 3 – Spring 2009		
<i>NOP 552</i>	<i>4 credits</i>	<i>Medical Neuroscience</i>
<i>PSL 535</i>	<i>4 credits</i>	<i>Cell Biology and Physiology II</i>
<i>MMG 522</i>	<i>5 credits</i>	<i>Medical Microbiology & Immunology</i>
<i>HM 561</i>	<i>2 credits</i>	<i>Basic Principles of Pathology</i>
OST 501	4 credits	Clinical Skills
OMM 502	1 credit	Osteopathic Manipulative Medicine II
<i>Note: DPR/Clinical Skills Assessment – Finals week of Semester 3</i>		
SEMESTER 4 – Summer 2009		
<i>PHM 563</i>	<i>3 credits</i>	<i>Medical Pharmacology</i>
<i>RAD 553</i>	<i>1 credit</i>	<i>Introduction to Radiology</i>
<i>Note: Satisfactory completion of basic science courses required as prerequisites for subsequent courses</i>		
OST 511	7 credits	Systems Biology Neuromusculoskeletal I
OMM 503	1 credit	Osteopathic Manipulative Medicine III
*FCM 650	1 credit	Principles of Family Medicine II
SEMESTER 5 – Fall 2009		
OST 512	5 credits	Systems Biology: Neuromusculoskeletal II
OST 522	5 credits	Systems Biology: Gastrointestinal
OST 527	4 credits	Systems Biology: Female Reproduction
OST 528	2 credits	Systems Biology: Growth and Development
OST 529	2 credits	Systems Biology: Endocrinology
OST 536	3 credits	Behavioral System
OMM 504	1 credit	Osteopathic Manipulative Medicine IV
FCM 640	1 credit	Principles of Family Medicine I
*FCM 650	1 credit	Principles of Family Medicine II
SEMESTER 6 – Spring 2010		
OST 519	2 credits	Ethics, Policy and Jurisprudence
OST 521	2 credits	Systems Biology: Hematopoietic
OST 523	3 credits	Systems Biology: Genitourinary
OST 524	8 credits	Systems Biology: Cardiovascular
OST 525	6 credits	Systems Biology: Respiratory
OST 538	1 credit	Chronic Illness
OMM 505	1 credit	Osteopathic Manipulative Medicine V
*FCM 650	1 credit	Principles of Family Medicine II
SEMESTER 7 – Summer 2010 (First Session)		
OST 526	2 credits	Systems Biology: Integumentary
OST 532	1 credit	Systems Biology: Growth & Development Cases
<i>Note: DPR/Clinical Skills Assessment – Proposed</i>		
<i>* One FCM 650 is to be completed in either semester 4, 5, or 6.</i>		
Clerkship Curriculum – COM Class of 2012		
Summer 2010 (Second Session) Begin Clerkships		
Satisfactory completion of all prior coursework required for entry to clerkships		

M1 Sequence Dates 2008-2009

	Sequence	Duration	Start Date	End Date	Quiz Dates	Exam Dates
FALL TERM	Patients & Populations (500POP) (T. Gelehrter)	3.5 weeks	8/6/2008	8/29/2008	5 PM 8/15/08 - 11:59 PM 8/17/08 5 PM 8/22/08 - 11:59 PM 8/24/08	5 PM 8/28/08 - 11:59 PM 9/1/08
	Cells & Tissues (500CEL) (P. Weinhold, A. Seasholtz)	4 weeks	9/2/2008	9/26/2008	5 PM 9/5/08 - 11:59 PM 9/7/08 5 PM 9/12/08 - 11:59 PM 9/14/08 5 PM 9/19/08 - 11:59 PM 9/21/08	5 PM 9/26/08 - 11:59 PM 9/28/08 Anatomy Practical: 1-5 PM 9/26/08
	Clinical Foundations of Medicine (500CLN) (R. Lash)	1 week	9/29/2008	10/3/2008	n/a	1 PM 10/3/08 - 11:59 PM 10/5/08
	Musculoskeletal (513MUS) (T. Gest)	3 weeks	10/6/2008	10/24/2008	5 PM 10/10/08 - 11:59 PM 10/12/08 5 PM 10/17/08 - 11:59 PM 10/19/08	5 PM 10/24/08 - 11:59 PM 10/26/08 Anatomy Practical: 1-5 PM 10/24/08
	Cardiovascular/Respiratory (504CAR) (L. D'Alecy)	4.5 weeks	10/27/2008	11/21/2008	5 PM 10/31/08 - 11:59 PM 11/2/08 5 PM 11/7/08 - 11:59 PM 11/9/08 5 PM 11/14/08 - 11:59 PM 11/16/08	5 PM 11/21/08 - 11:59 PM 11/26/08 Anatomy Practical: 1-5 PM 11/24/08
	Clinical Foundations of Medicine (500CLN) (R. Lash)	1 week	12/1/2008	12/5/2008	n/a	1 PM 12/5/08 - 11:59 PM 12/7/08
	Renal (506REN) (T. Stein)	2 weeks	12/8/2008	12/19/2008	5 PM 12/12/08 - 11:59 PM 12/14/08	5 PM 12/18/08 - 11:59 PM 12/21/08 Anatomy Practical: 1-5 PM 12/19/08
WINTER TERM	Gastrointestinal (508GAS) (M. Velkey)	3 weeks	1/5/2009	1/23/2009	5 PM 1/9/09 - 11:59 PM 1/11/09 5 PM 1/16/09 - 11:59 PM 1/19/09	5 PM 1/23/09 - 11:59 PM 1/25/09 Anatomy Practical: 1-5 PM 1/23/09
	Endocrine/Reproduction (510END) (R. Mortensen)	2 weeks	1/26/2009	2/6/2009	5 PM 1/30/09 - 11:59 PM 2/1/09	5 PM 2/6/09 - 11:59 PM 2/8/09 Anatomy Practical: 1-5 PM 2/6/09
	Immunology (501IMM) (W. Dunnick)	2 weeks	2/9/2009	2/20/2009	5 PM 2/13/09 - 11:59 PM 2/15/09	5 PM 2/20/09 - 11:59 PM 2/22/09 Anatomy Practical: 1-5 PM 2/20/09
	Spring Break (for AAPS & Campus, too)		2/23/2009	3/1/2009		
	Clinical Foundations of Medicine (501CLN) (R. Lash)	1 week	3/2/2009	3/6/2009	n/a	5 PM 3/6/2009 - 11:59 PM 3/8/09
	CNS/Head & Neck (509CNS) (P. Hitchcock)	3 weeks	3/9/2009	3/27/2009	5 PM 3/13/09 - 11:59 PM 3/15/09 5 PM 3/20/09 - 11:59 PM 3/22/09	5 PM 3/27/09 - 11:59 PM 3/29/09 Anatomy Practical: 1-5 PM 3/27/09
	Clinical Foundations of Medicine (501CLN) (R. Lash)	1 week	3/30/2009	4/3/2009	n/a	5 PM 4/3/09 - 11:59 PM 4/5/09
	Infectious Disease/Microbiology (500INF) (C. Kauffman, D. Shewach, M. Swanson)	5 weeks	4/6/2009	5/8/2009	5 PM 4/10/09 - 11:59 PM 4/12/09 5 PM 4/17/09 - 11:59 PM 4/19/09 5 PM 4/24/09 - 11:59 PM 4/26/09 5 PM 5/1/09 - 11:59 PM 5/3/09	5 PM 5/8/09 - 11:59 PM 5/10/09
	Clinical Foundations of Medicine (501CLN) (R. Lash) & Growth & Development (500HGD) (B. Williams, S. O'Shea)	3 weeks	5/11/2009	5/29/2009	5 PM 5/15/09 - 11:59 PM 5/17/09 5 PM 5/22/09 - 11:59 PM 5/24/09	5PM 5/29/09 - 11:59 5/31/09

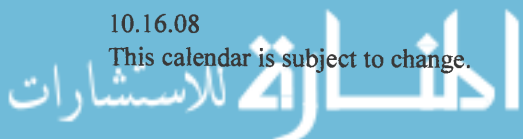
**M2 Sequence Dates
2008-2009**

FALL TERM	Duration	Sequence Start Date	Sequence End Date	Quiz/Exam Dates
Cardiovascular (604CAR) (K. Eagle, M. Shlafer, B. Dyke, P. Hagan)	3.5 weeks	8/18/2008	9/8/2008	Quiz: 5 PM 8/22/08 - 11:59 PM 8/24/08 Exam: 5 PM 9/8/08 - 11:59 PM 9/10/08
Respiratory (605RES) (P. Christensen, J. Younger, T. Sisson)	2 weeks	9/11/2008	9/23/2008	Quiz: 5 PM 9/12/08 - 11:59 PM 9/14/08 Exam: 5 PM 9/23/08 - 11:59 PM 9/25/08
Renal (606REN) (J. Weinberg, P. Killen)	2.5 weeks	9/26/2008	10/10/2008	Quiz: 5 PM 10/3/08 - 11:59 PM 10/5/08 Exam: 5 PM 10/10/08 - 11:59 PM 10/13/08
Clinical Foundations of Medicine (600CLN) (R. Lash)	2 weeks	10/14/2008	10/24/2008	Exam: 5 PM 10/24/08 - 11:59 PM 10/26/08
Psychiatry (614PSY) (M. Jibson)	1 week	10/27/2008	10/31/2008	Exam: 5 PM 10/31/08 - 11:59 PM 11/2/08
Neuroscience (609NEU) (includes Special Senses) (D. Gelb) SS-(S. Mian, H.A. Arts)	3.5 weeks	11/3/2008	11/24/2008	Quiz: 5 PM 11/7/08 - 11:59 PM 11/9/08 Exam: 8AM 11/22/08 - 11:59 PM 11/26/08
Musculoskeletal (613MUS) (S. Monrad)	2 weeks	12/1/2008	12/9/2008	Exam: 5 PM 12/9/08 - 11:59 PM 12/11/08
Dermatology (612DER) (T. Wang)	1 week	12/12/2008	12/18/2008	Exam: 12 Noon 12/18/08 - 11:59 PM 12/21/08

WINTER TERM	Duration	Sequence Start Date	Sequence End Date	Quiz/Exam Dates
Hematology/Oncology (603HEM) (P. Bockenstedt, L. Stoolman)	2 weeks	1/5/2009	1/16/2009	Exam: 5 PM 1/16/09 - 11:59 PM 1/19/09
Clinical Foundations of Medicine (601CLN) (R. Lash)	2 weeks	1/20/2009	1/30/2009	Exam: 5 PM 1/31/09 - 11:59 PM 2/1/09
M2 CCA (M. Lukela)		1/30/2009	2/3/2009	
Gastrointestinal (includes ENT) (608GAS) (R. Van Dyke, H. Appelman)	2.5 weeks	2/4/2009	2/20/2009	Exam: 5 PM 2/20/09 - 11:59 PM 2/24/09
Endocrine (610END) (A. Kumagai, T. Giordano)	2 weeks	2/25/2009	3/6/2009	Exam: 5 PM 3/6/09 - 11:59 PM 3/8/09
Reproduction (611REP) (C. Stalburg, G.D. Smith)	2 weeks	3/9/2009	3/20/2009	Exam: 5 PM 3/20/09 - 11:59 PM 3/22/09

10.16.08

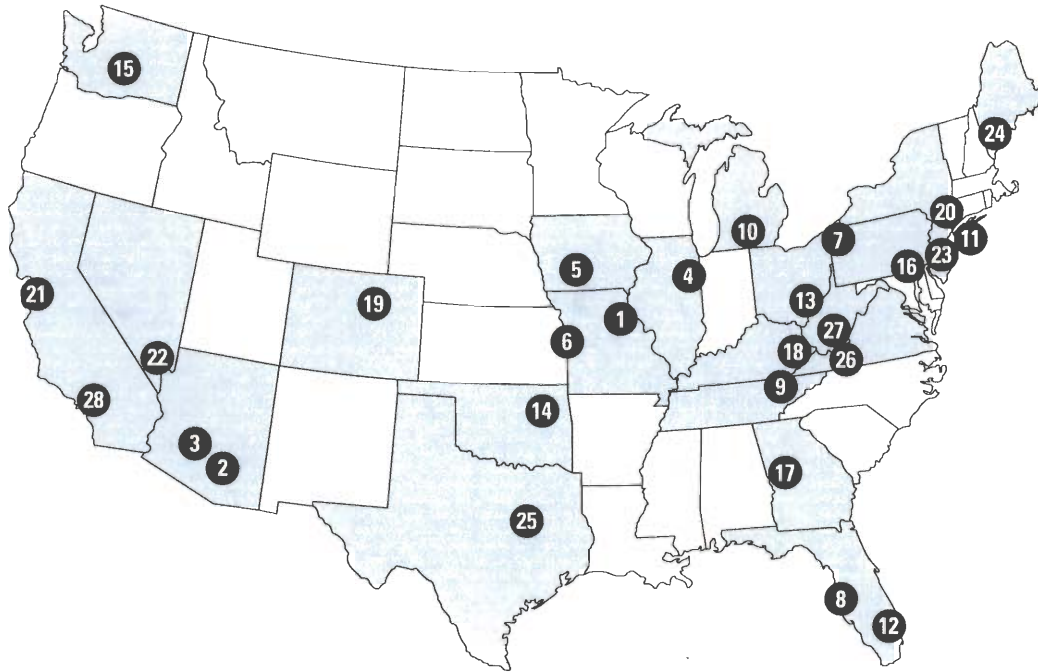
This calendar is subject to change.



No Classes - 9/1/08 Labor Day, 11/27-11/28/08 Thanksgiving Holiday, 1/19/09 MLK, Jr. Day

www.manaraa.com

The American Osteopathic Association's Commission on Osteopathic College Accreditation (COCA) currently accredits 25 colleges of osteopathic medicine in 28 locations.



1. A.T. Still University of Health Sciences/ Kirksville College of Osteopathic Medicine (ATSU/KCOM)
800 West Jefferson Street
Kirksville, Missouri 63501
(660) 626-2121
<http://www.atsu.edu>
2. A.T. Still University of Health Sciences/School of Osteopathic Medicine – Arizona (ATSU/SOMA)
5850 East Still Circle
Mesa, Arizona 85206
(480) 219-6000
<http://www.atsu.edu>
3. Arizona College of Osteopathic Medicine of Midwestern University (AZCOM)
19555 North 59th Avenue
Glendale, Arizona 85308
(623) 572-3200
<http://www.midwestern.edu/azcom/>
4. Chicago College of Osteopathic Medicine of Midwestern University (CCOM)
555 31st Street
Downers Grove, Illinois 60515-1235
(630) 969-4400
<http://www.midwestern.edu/ccom/>
5. Des Moines University–College of Osteopathic Medicine (DMU-COM)
3200 Grand Avenue
Des Moines, Iowa 50312
(515) 271-1400
<http://www.dmu.edu/com/>
6. Kansas City University of Medicine and Biosciences College of Osteopathic Medicine (KCUMB-COM)
1750 Independence Boulevard
Kansas City, Missouri 64106-1453
(816) 283-2000
<http://www.kcumb.edu>
7. Lake Erie College of Osteopathic Medicine (LECOM)
1858 West Grandview Boulevard
Erie, Pennsylvania 16509
(814) 866-6641
<http://www.lecom.edu>
8. LECOM–Bradenton Campus (LECOM-Bradenton)
5000 Lakewood Ranch Boulevard
Bradenton, Florida 34211-4909
<http://www.lecom.edu/bradenton/>

9. Lincoln Memorial University—DeBusk College of Osteopathic Medicine (LMU-DCOM)
6965 Cumberland Gap Parkway
Harrogate, Tennessee 37752
(423) 869-3611
<http://www.lmunet.edu/dcom>
10. Michigan State University College of Osteopathic Medicine (MSUCOM)
East Fee Hall
East Lansing, Michigan 48824
(517) 355-9616
<http://www.com.msu.edu/>
11. New York College of Osteopathic Medicine of New York Institute of Technology (NYCOM/NYIT)
Northern Boulevard
Old Westbury, New York 11568-8000
(516) 686-3747
<http://iris.nyit.edu/nycom/>
12. Nova Southeastern University—College of Osteopathic Medicine (NSU-COM)
3200 South University Drive
Fort Lauderdale, Florida 33328
(954) 262-1100 or 1-800-356-0026
<http://medicine.nova.edu>
13. Ohio University College of Osteopathic Medicine (OUCOM)
Grosvenor, Irvine and Parks Halls
Athens, Ohio 45701
(740) 593-2500
<http://www.oucom.ohiou.edu>
14. Oklahoma State University Center for Health Sciences—College of Osteopathic Medicine (OSU-COM)
1111 West 17th Street
Tulsa, Oklahoma 74107
(918) 582-1972
<http://www.healthsciences.okstate.edu/college/>
15. Pacific Northwest University of Health Sciences College of Osteopathic Medicine (PNWU-COM)
111 South 33rd Street, Suite 104
Yakima, WA 98901
(509) 452-5100
<http://www.pnwu.org>
16. Philadelphia College of Osteopathic Medicine (PCOM)
4170 City Avenue
Philadelphia, Pennsylvania 19131-1694
(215) 871-6100
<http://www.pcom.edu>
17. Georgia Campus—Philadelphia College of Osteopathic Medicine (GA-PCOM)
625 Old Peach Tree Road
Gwinnett County, Georgia 30024
(678) 225-7531
http://www.pcom.edu/General_Information/georgia/georgia.html
18. Pikeville College School of Osteopathic Medicine (PCSOM)
147 Sycamore Street
Pikeville, Kentucky 41501-1194
(606) 432-9617
<http://pcsom.pc.edu>
19. Rocky Vista University College of Osteopathic Medicine (RVUCOM)
8401 S. Chambers Rd.
Parker, CO 80134
(303) 373-2008
<http://www.rockyvistauniversity.org>
20. Touro College of Osteopathic Medicine—New York (TOUROCOM)
230 West 125th Street
New York City, New York 10027
(212) 851-1199
<http://www.touro.edu/med/>
21. Touro University College of Osteopathic Medicine (TUCOM-CA)
1310 Johnson Lane
Vallejo, California 94592
(707) 638-5200 or 1-888-652-7580
<http://www.tu.edu>
22. Touro University of Nevada College of Osteopathic Medicine—Nevada Campus (TUNCOM-NV)
874 American Pacific Drive
Henderson, Nevada 89014
<http://www.tu.edu/departments.php?id=44>
23. University of Medicine and Dentistry of New Jersey—School of Osteopathic Medicine (UMDNJ-SOM)
One Medical Center Drive, Suite 312
Stratford, New Jersey 08084
(856) 566-6000
<http://som.umdj.edu/>
24. University of New England College of Osteopathic Medicine (UNECOM)
11 Hills Beach Road
Biddeford, Maine 04005
(207) 283-0171
<http://www.une.edu/com/>
25. University of North Texas Health Science Center at Fort Worth/Texas College of Osteopathic Medicine at Fort Worth (UNTHSC/TCOM)
3500 Camp Bowie Boulevard
Fort Worth, Texas 76107
(817) 735-2000
<http://www.hsc.unt.edu/education/tcom/>
26. Edward Via Virginia College of Osteopathic Medicine (VCOM)
2265 Kraft Drive
Blacksburg, Virginia 24060
(540) 443-9106
<http://www.vcom.vt.edu>
27. West Virginia School of Osteopathic Medicine (WVSOM)
400 North Lee Street
Lewisburg, West Virginia 24901-1961
(304) 645-6270
<http://www.wvsom.edu>
28. Western University of Health Sciences/College of Osteopathic Medicine of the Pacific (Western U/COMP)
309 East Second Street/College Plaza
Pomona, California 91766-1889
(909) 623-6116
<http://www.westernu.edu/comp.html>