



## Forensic Podiatry

Podiatrists now play a key role  
in solving crimes.

BY BRYAN B. KAGAN, DPM

### Goals and Objectives

This CME article for podiatrists, residents, interns, and students will focus on the definition and discipline of forensic podiatry in the forensic community. The article will introduce the reader to the new subspecialty field of forensic podiatry, stressing static barefoot analysis, insole impression analysis, methodologies and expert witness testimony. After reading the article, the reader will have gained knowledge, understanding, and an appreciation of forensic podiatry.

At the completion of the article, the reader will be able to understand and appreciate the podiatric role in forensic medicine and be able to identify, describe, and differentiate the techniques related to barefoot/insole analysis, the methodologies utilized, and expert witness testimony. In addition, the reader will be able to analyze barefoot prints and insole prints.

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Following this article, an answer sheet and full set of instructions are provided (pg. 150).—**Editor**

### Introduction

Forensic science is the compilation of systematic methodologies to understand the physical world through observation and experimentation. It links people, places, and things that are involved in and with criminal activities. It merges science

and law and assists in the investigations and adjudications of criminal and civil cases. Criminal law cases deal with crime and the legal punishment of the offense.<sup>1</sup> These can involve theft, assault, arson, robbery, murder, and trafficking of controlled substances. Civil law cases deal with

disputes between individuals, organizations or between the two in which punitive fines/compensation is awarded to the victim. Examples of civil cases include landlord and tenant disputes, divorce proceedings, property disputes, and personal injury.

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Many disciplines in forensic science are evolving. Forensic biology includes forensic pathology, archaeology,<sup>2</sup> odontology, entomology, serology, DNA analysis, and blood stain analysis. Forensic chemistry includes drugs, arson, explosives, toxicology, and paints. Trace evidence includes hair, fibers, soils, and glass. Physical evidence includes friction ridge examination, questioned documents, firearms, tool marks, tire treads, shoe prints, and any impression evidence (Figures 1a-c). Other areas, to name a few, include forensic engineering, botany, psychology, nursing, accounting, fraud investigation, computer forensics, and jurisprudence.<sup>3</sup>



Figure 1A: Tire Impression. Tire Tread and Tire Track Evidence, Law Enforcement Training Network, p 13 ©2009

It shows linkage of an individual with a crime scene through pedal evidence and answers any legal questions concerning the



Figure 1C: Reading the Soil. Galvin B., "Reading the Soil" Evidence Technology Magazine, July/August 2013, 18

## Forensic podiatry falls under the main category of physical evidence.

Forensic podiatry is a subspecialty of podiatric medicine and offers an exciting new aspect of podiatric medical practice as an evolving discipline in the forensic sciences. "The discipline of forensic podiatry applies sound and researched podiatric knowledge and experience in foren-

foot or footwear that requires knowledge of the functioning foot."<sup>4</sup>

### History

The history of American forensic podiatry began in September 2000 when the "First Annual Forensic Podiatry Seminar" was held in Scottsdale, Arizona. Eighteen podiatrists and several law enforcement personnel attended. For comparison, the first forensic conference held by the International Association for Identification almost 100 years ago in California attracted 22 law enforcement personnel. Membership now stands in the thousands. "In September 2003, the American Society of Forensic Podiatry (ASFP) was formed (Figure 2). By-laws were organized and accepted, and 22 individuals joined as charter members. In July 2007, a forensic podiatry sub-committee was es-



Figure 1B: Shoeprint. Personal photo file

tablished within the structure of the International Association for Identification (IAI) with the help of ASPF members."<sup>5</sup> The role and scope of forensic podiatry practice was delineated by the IAI; "forensic podiatrists assist in the identification of perpetrators of crime evaluating the static and dynamic foot and the footwear that housed it, to include barefoot prints (in blood, dirt, dust or in the sock liner), foot wear (outsole and upper wear patterns relative to foot pathology) and Closed Circuit Television (CCTV) Evidence."<sup>6</sup>

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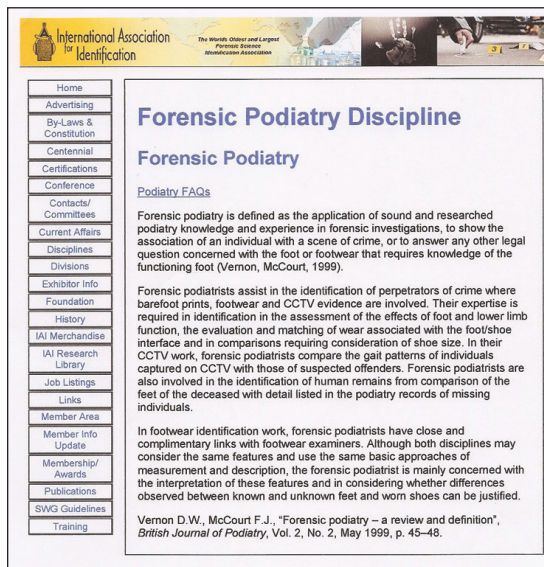


Figure 2: Forensic Podiatry Discipline. Forensic Podiatry Discipline, International Association for Identification website.

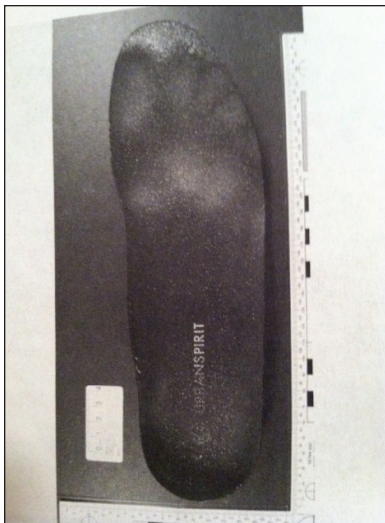


Figure 3A: Wear Associated with Foot/Shoe Interface. DiMaggio J—Instructor, Forensic Podiatry Training Class, Tucson, Arizona, November 2008

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**The Human Foot**

The human foot is determined initially by its genetic code. The volar pads at approximately 8 embryological weeks develop into unique friction ridges, and foot and toe prints. Influenced during growth by the personal biomechanics of each individual, injuries and other physiological changes and pathologies, the foot develops into an adult structure that is highly individual in its form, size, and shape. Since no two feet are ex-



Figures 3B/3C: Wear Associated with Foot/Shoe Interface. Personal Photo File

actly the same, no two bare footprints or barefoot impressions can be identical unless created by the same individual. “The forensic podiatrist’s evaluation of the evidence

impression. The forensic podiatrist’s expertise is therefore required

1) to assess the effects of the foot and lower limb function.

2) to evaluate the wear associated with a foot/shoe interface (Figures 3a-c).

3) to compare shoe size considerations (Figures 4a-b).

4) to compare the gait patterns of individuals captured on CCTV with those of suspected individuals (Figure 5).

5) to identify human remains from comparison of podiatry records

**The volar pads at approximately 8 embryological weeks develop into unique friction ridges, and foot and toe prints.**

is often necessary because of the complexity of the human foot and the subtle variances inherent to such and the footwear housing it”. (John DiMaggio-2003 personal correspondence) In *Crown vs. Chester-Nash 2006*, it was necessary to determine if more than one individual could have worn a shoe that was linked to a murder and how much wear would be necessary before leaving a permanent

and x-rays with the feet of deceased individuals.

**Education and Training**

A forensic podiatrist must attain a DPM degree or a BSc degree in podiatry. A level of expertise to practice in a medical-legal context must be developed. A Masters degree in forensic podiatry, forensic science, and/or forensic human identification is another pathway to pursue. The forensic podiatrist must continue his education in expert witness training programs, forensic podiatry, or related training workshops and/or seminars. He/she must continue his/her professional development with participation in research activities in forensic podiatry, and would be expected to publish in forensic journals or magazines, and/or present his research results at forensic conferences/seminars (Figure 6).

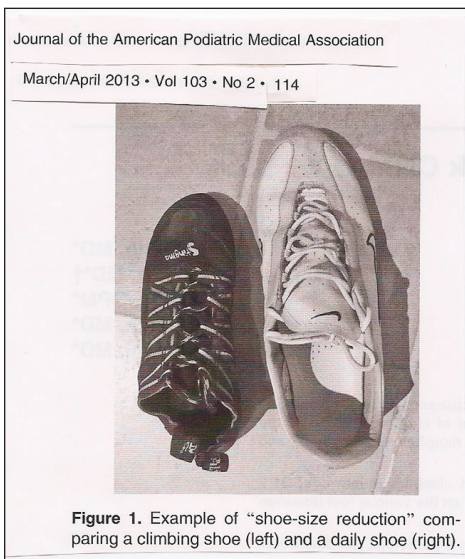


Figure 1. Example of “shoe-size reduction” comparing a climbing shoe (left) and a daily shoe (right).

Figure 4A: Shoe Size Considerations I. JAPMA, March/April 2013 vol 103, Nov 114

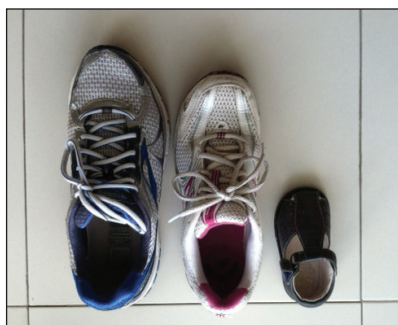


Figure 4B: Shoe Size Consideration II. Personal Photo File

“Evidence is any object that

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Figure 5: Gait Patterns. Personal Photo File

can establish that a crime has been committed or that can link a crime and its victim or perpetrator.”<sup>7</sup> “Information is whether in the form of personal testimony, the language of documents, or the production of material objects, that is given in a legal investigation,”<sup>8</sup> to establish the fact or point in question. Whenever two objects come in contact, an exchange of matter or information occurs. This is the definition of the Locard Exchange Principle. That information may be too small to analyze or to detect, but that transfer has occurred nonetheless. It is those transfers that establish the links and associations between victims, suspects, weapons, crime scenes, and/or anything involved in a crime. There are two



Figure 6: Training Seminars.

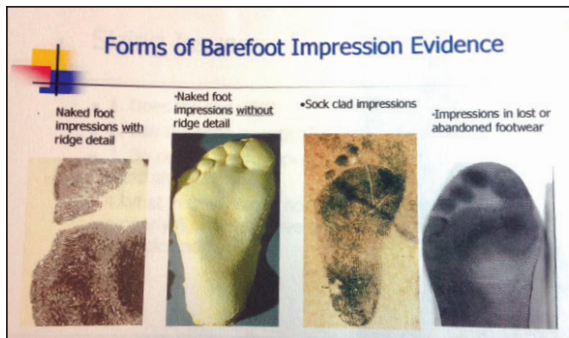


Figure 7: Forms of Barefoot Impression Evidence. DiMaggio J, Kagan BB, “Pedal Evidence”, Chesapeake Bay Division of the IAI Spring Conference, April 2013.

form of footprints either bare (Figure 7) or in socks, in blood, dust, or dirt, (mud/dry) and can be patent (visible to the naked eye), plastic (in clay, gum), or latent (requiring additional processing to be viewed).

Footwear-related identification regarding sizing issues, ownership, and assisting the footwear examiner, gait

gy (Analysis, Comparison, Evaluation—Verification).

Analysis is the assessment of the footprint to determine if the detail quality is reasonably sufficient to classify and evaluate. In Bare Footprint/Outline (Figure 9), the foot length/width, height approximation, digital pattern, pressure zones, morphology, shoe size, gender, skin creases, and papillary ridge pattern are all analyzed. The basic foot is comprised of three zones: forefoot-40%, mid-foot-30% and rear-foot-30%. The percentages are also useful when a partial print is presented for analysis to determine approximate height. In addition, there are multiple identification lines

(heel lines, arch line, lateral arch line, web ridge line, and web space outline) that are analyzed for further identification.

Depending on the specifics of the case, exemplars will be required for comparison. These may be bare footprints of known individuals, their gait pattern, photographs, or foam impressions.

At times, footprints and im-

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### The basic foot

**is comprised of three zones: forefoot-40%, mid-foot-30% and rearfoot-30%.**

types of evidence in forensic sciences. Real (physical) Evidence is recovered from the crime scene or another location where the victim or suspect has been. Demonstrative Evidence is not recovered at the crime scene but is created by an expert witness to help explain the real evidence that is found (i.e. shooting scene reconstruction, blood stain pattern analysis, recreation of a crime scene).

Pedal evidence may be in the

pattern characteristics observed on CCTV (Figure 8) and mass disaster identification are also other forms of pedal evidence.

#### ACE-V Methodology

A general methodology outline for the identification process has been developed to assist the podiatrist in making and justifying decisions. The acronym for the steps in this process is the ACE-V Methodology



Figure 8: CCTV. Personal Photo File

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pression “although visible and photographable with existing natural light does not allow the maximum detail to be recorded with that light-

Cyanoacrylate (super glue) fuming which can be further enhanced by dye staining with visible or luminescence-inducing dyes, i.e. Gentian violet, Rhodamine 6G, Ardrex 970-P10, Ninhydrin which reacts with

amino acids that give a purple reaction. Another chemical, Luminol (Figure 11) “reacts by producing light, chemo-luminescence, rather than color when applied at a crime scene to detect latent blood.”<sup>9</sup> Many other newer chemicals are being developed currently to enhance visualization of impressions.

During the Comparison stage of investigation, the “unknown” evidence is analyzed side-to-side, super-imposing and measuring with the known entity. After comparing the two, the forensic podiatrist must come to a conclusion. There are several possibilities, Non-Identification (to include also probable non-identification), Identification (to include probable and very probable)

**Levels of Certainty were devised to address the confusion in terminology such as “possible” and “probable.”**

ing. Greater contrast and detail can be recorded in photographs with Oblique lighting. Oblique lighting creates shadowing between the high and low areas of the impression which provides greater contrast in the impression photograph (Figure 10). For two-dimensional impressions, such as found in dust or residue, the light should be held very close to the ground to photograph. In three-dimensional impressions, such as found in sand, soil and snow, the light should be adjusted as needed as to create the best contrast impression. The camera should be placed on a tripod with the film plane parallel to the impression to prevent movement.”<sup>9</sup>

Forensic light sources are also widely used to reveal images that may not be readily visible to the eye. “The use of this equipment has been valuable in highlighting faint images that may be present on shoe insoles or sock liners. These light sources cover a wide range of wavelengths within the ultraviolet, visible and infrared spectrums and require safety features to protect the operator from eye damage. More cost effective LED light sources are now available and are gaining in popularity.”<sup>10</sup> The objective of these light sources is to maximize the contrast in the impressions to effectively reveal detail for later analysis.

Many chemical methods have been developed to enhance the detailed visualization of latent impressions left at the crime scene. “Most of the chemical processes are not suitable to use at the crime scene but are very useful on the items submitted to the laboratory.”<sup>11</sup> These include

amino acids, proteins and peptides to form a dark purple product known as Ruhemann’s purple, and Diazafluorenone (DFO) which is sensitive to

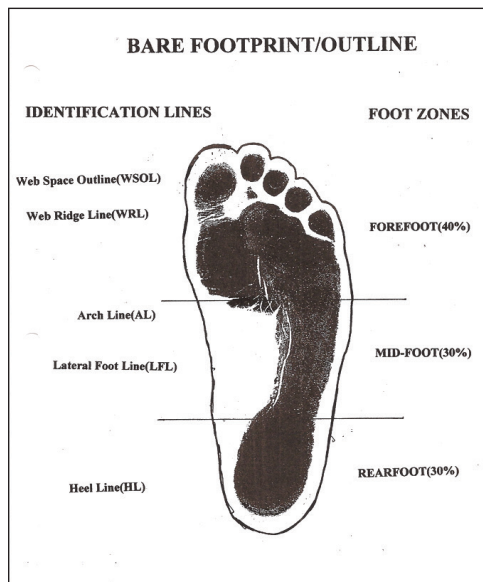


Figure 9: Bare Footprint Outline. DiMaggio J—Instructor, Forensic Podiatry Training Class, Tucson, Arizona, November 2008

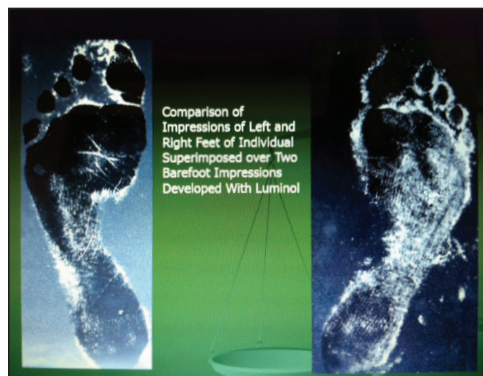


Figure 11: Luminol Enhanced. DiMaggio J—Instructor, Forensic Podiatry Training Class, Tucson, Arizona, November 2008



Figure 10: Oblique Lighting. Personal Photo File



Figure 12: Is It a Footprint? Personal Photo File

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and Inconclusive. To address the confusion with different terminology such as probable, possible, etc., and to increase the comprehension by juries, judiciary, and attorneys. Dr. John DiMaggio devised a logical methodology in 2005 to confirm the Evaluation findings in a stepwise manner.

“Levels of Certainty” are conclusions for pedal evidence. The findings are expressed in the affirmative, ranging from Level I (least) to Level V (most) that can be adapted to other disciplines in forensic sciences as well. Verification is the final step where a colleague with an understanding of the process will perform the ACE steps on the same “unknown” evidence. The outcome of the first forensic podiatrist’s comparison should not be known to the second until after he has completed the process. They should both agree on the conclusion. It is a quality check of the work undertaken. It is especially important because of the subjective element involved in reaching forensic conclusions. Verification confirms that the work is replicable by other competent examiners.

**Levels of Certainty (DiMaggio 2005)**

*Level I:* Is it a footprint? If the answer is in the affirmative, subsequent questions will follow. Is it a partial or full footprint (Figure 12)? Is it a dynamic or static impression? Is there sufficient quality to continue? If the answer is still in the affirmative, then the examiner proceeds to the next level. If there is no affirmation,

## Luminol reacts by producing light, chemo-luminescence, rather than color when applied at a crime scene to detect latent blood.

then an inconclusive identification or non-identification and exclusion will result. Inclusion is based on the agreement of general features; the larger the number of similar size and shape features, the less likely the impression was made by others in the general population. On the other

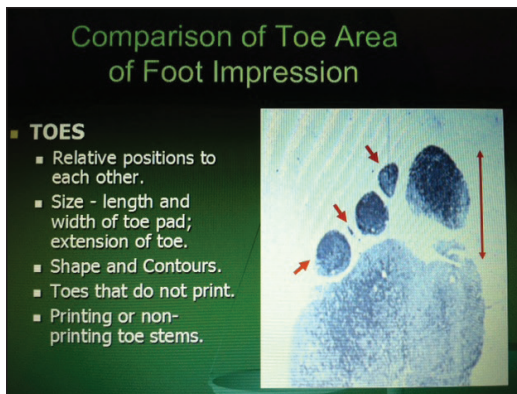


Figure 13: Level II Digital Positions (B). DiMaggio J, Kagan BB, “Pedal Evidence”, Chesapeake Bay Division of the IAI Spring Conference, April 2013.



Figure 15: Class Level Characteristics. DiMaggio J, Kagan BB, “Pedal Evidence”, Chesapeake Bay Division of the IAI Spring Conference, April 2013.

hand, when a foot is determined not to have made the impression based on confirmable and significant differences, it is excluded.

*Level II:* (Foot Zones) Is there an agreement in the size, shape, and position of the digits and foot zones (Figure 13)? If the answer is in the

affirmative, then the examiner proceeds to the next level.

*Level III:* (Lines of Identification) Is there an agreement of the identification lines, specifically the web ridge line, the arch line and lateral foot line, the heel line, and web space outline? If the answer is in the

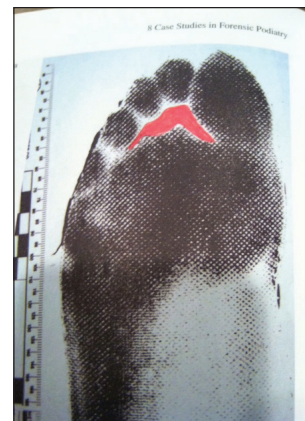


Figure 14: Level III Web Space Outline (B). DiMaggio J, Kagan BB, “Pedal Evidence”, Chesapeake Bay Division of the IAI Spring Conference, April 2013.

affirmative, then the examiner proceeds to the next level (Figure 14).

*Level IV:* This is the level where the forensic podiatrist’s clinical experience and knowledge of pathological, morphological, and biomechanical imbalances are drawn upon. This is the level of Class characteristics (Figure 15). “Physical evidence can express different levels of individuality; from

those features that a large proportion of the population demonstrates, and from those features that the probability of a chance match is so remote as to be considered impossible.

Class level characteristics are not unique but demonstrate incontrovertible compatibility between similar items, i.e. bunions, hammertoes. There is no evidence considered and utilized by forensic podiatrists that has been demonstrated to exhibit unique individual identification; however, the evidential weight of evidence differs considerably. A condition present in 20% of the population is weaker than one that is present in 0.1% of the population. The task in forensic podiatry is to identify relevant features in the questioned and known items during comparison for identification purposes. The individuality of the features is determined by considering the prevalence in the population.”<sup>10</sup>

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**Forensic Gait Analysis**

Forensic gait analysis “involves the recognition and comparison of gait features to assist in the identification process. Captured on closed circuit television (CCTV), the characteristics of gait need to be examined in depth and, as in other identification processes, the unknown footage of an individual of interest in relation to a crime scene is compared against known footage that has been made of a known individual. Assessment of the quality of the images is imperative. CCTV images are usually of much lower quality and resolution than those in clinical settings.

CCTV images contain variables

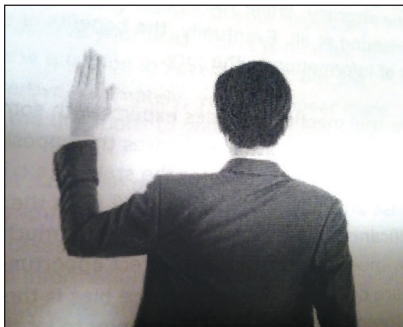


Figure 16A: Expert Testimony. Personal Photo File

**The Expert Witness**

**William W. Willis**  
 Johnson County Criminalistics Laboratory  
 Mission, KS

*(The following essay was printed in the Identification News, 33(5), incorrectly printed as volume 4 in May, 1983, after it was previously published in the Kansas Division's newsletter, The Prairie Whorlwind. The author's comments, edited from the original, remain equally pertinent after ten years.)*

An expert is generally defined as “a person who is skilled in a specific trade or occupation. Because of this particular knowledge, the expert is qualified to analyze or compare a stated set of facts and render an opinion based upon those facts.” [1] The expert's opinion is solicited because of the special knowledge about the subject which she or he has gained through training, experience, and skill. This knowledge is generally not possessed by the average layman.

Non-expert witnesses, as a general rule, must state only facts and not give opinions. A non-expert may testify to a relevant opinion if it is based on facts the witness observed. Non-experts are generally witnesses to crimes who testify in court as to what they saw take place. This testimony is based on direct observation of incidents concerning the trial. Lay witnesses, or non-experts, may estimate the speed of vehicles, distance, time, and other measurements. At times, based on their personal observations, they may be permitted to testify as to the recognition of another person's handwriting, if they are familiar with it, and, in some instances, voice identity, another person's identity, and even a person's state of mind.

J. Forensic Ident.  
 166 / 43 (P). 1993

Figure 16B: Expert Witness. Willis W, “The Expert Witness”, Journal of Forensic Identification, 166/43, 1993.

that need to be taken into account. Was the picture sharp or blurred, with good or poor contrast? Was the picture too bright or too dark? Was the lighting good or bad? Was there shadow or reflection interference? Was the direction of the light source good or poor? The frame rate needs to be evaluated; was there a contin-

(FRE) governs the admissibility of evidence in criminal and civil cases. It covers how evidence should be treated in the courts and how the expert witness can present that evidence. Even though it applied only to Federal courts, the majority of states have adopted similar rules for their courts. “The Rules of Evidence

**Analysis in ACE-V is to determine if quality of evidence is reasonable to classify and evaluate.**

uous flow of image or were there series of still images? From which direction was the image taken, side, front, or back? Was the subject viewed via only the upper body or lower body? Was the subject moving too fast or too slow? Were ten steps or more in the shot or less than two steps? Was the clothing worn good for gait analysis?”<sup>10</sup>

Also, the examiner must consider if the gait pattern could have been amended or altered in the recordings. The gait analysis performed in a clinical or laboratory setting is more controlled and ideal, thus allowing gait features and anomalies to be more readily recognized and identified than those observed on CCTV footage. Gait analysis is class level identification, Although not unique, “gait analysis is class level identification, demonstrating compatibility between similar items.”<sup>10</sup>

**Expert Testimony**

The forensic podiatrist is an “expert witness and as such is qualified to analyze and compare sets of facts and then render an opinion based on those facts.”<sup>11</sup> “The credible expert must be thoroughly prepared to demonstrate a command of the scientific knowledge in their field of expertise, to understand the procedures of the court and the evidence admissibility standard in their jurisdiction. They must be open in their dealings with attorneys and willing to discuss their findings and conclusions within the bounds of the trial practice for the type of case in which they are serving as an expert. (Figures 16a-b)”<sup>12</sup>

The Federal Rules of Evidence

helps to ensure that juries only consider admissible material and relevant evidence. The rules secure fairness in administration, eliminate unjustifiable expenses and delays, and promote growth and development of the law of evidence so that in the end, truth may be ascertained and the proceedings justly determined. Rule 702 of the FRE delineates the testimony of experts. If scientific, technical, or specialized knowledge will assist to help to understand the evidence, an expert may testify an opinion. The testimony must be based on sufficient facts or data, and be the product of reliable methods and principles. The witness must apply the principles and methods to the facts of the case.”<sup>11</sup>

The landmark Supreme Court decision that involved the admissibility of scientific evidence was Frye v United States (1923). The case involved a polygraph test in a murder crime. The test was considered a new science that had not been accepted by the relevant scientific community. The evidence presented was therefore not admitted. This became the standard known as the Frye rule or test of general acceptance. The United States Supreme Court case that changed the rules of evidence was Daubert v Merrill-Dow Pharmaceuticals, Inc (1993). Daubert deals with the admissibility of expert witness testimony during legal proceedings. The testimony must be relevant and reliable. The Daubert Factors is a non-exclusive checklist that was created to assess the reliability of scientific expert testimony:

- 1) The theory or technique must be refutable, testable and falsifiable;

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- 2) The theory or technique has to be subjected to publication and peer review;
- 3) There must be a known or potential error rate of the theory or technique;
- 4) Standards and controls of the theory or technique must exist and be maintained.

Forensic practitioners must operate at the highest standards. They must comply with the codes of conduct of the professional body(ies) with which they are members with honesty and integrity. They must be

writing a report on your conclusions.

- 1) Understanding the task requested.
- 2) Describing the exhibits, items, and material examined. What exactly was it that was examined?
- 3) Establishing that the exhibits, items, and material submitted were of suitable quality to be examined.
- 4) Confirming that the correct types of examinations and procedures were selected.
- 5) Confirming that the examinations and procedures were performed competently.
- 6) Recording and interpreting the evidence and making a reasoned and sound objective conclusion.

**Daubert factors are applied to assess the reliability of testimony except when there may be an unknown error rate of the theory.**

non-discriminatory against people and groups. Their primary duty is to the court. Work must be carried out fairly and impartially and any conflicts of interest must be declared at the first opportunity. "It is the responsibility of the forensic podiatrist to ensure professional competence. This can be accomplished by continuing professional development with formal educational instruction, professional reading, mentorship, attendance at conferences and seminars, and the preparation of conference presentation materials which should all be documented in a learning diary or log."<sup>10</sup>

There are standards of practice that the forensic podiatrist must maintain. He/she must "inform others where there is potential for a miscarriage of justice. He/she must provide quality assurance and accept full responsibility for all the work undertaken or participated in. He/she must be prepared to change their opinion in the presence of new developments, information or research findings. It is imperative that confidentiality be maintained."<sup>10</sup>

**Writing a Report**

There are ten essentials when

- 7) Referring to others involved in the investigation and recommending other specialties, where and when appropriate.
- 8) Presenting a clear, methodical, and logical report.
- 9) Ensuring that the report is fit for the purpose requested.
- 10) Providing evidence of continuing education and expertise.<sup>10</sup>

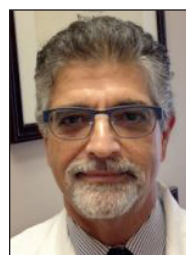
**Conclusion**

Forensic podiatry is an exciting, evolving discipline in forensic sciences and a growing subspecialty in podiatric medicine. Membership in the American Society of Forensic Podiatry has also been increasing, according to Dr. John DiMaggio, president of the ASFP. Forensic clubs have already been established at Temple University School of Podiatric Medicine and the New York College of Podiatric Medicine, and interest in establishing a club at the Dr. William M Scholl College of Podiatric Medicine has also been expressed. An elective forensic podiatry course was introduced at the New York College of Podiatric Medicine in 2013. The expanding awareness of forensic podiatry in the forensic and legal worlds through education, research and scientific par-

ticipation, and collaboration with national and international organizations will afford greater opportunities and increase the need for qualified individuals to provide these services. **PM**

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- <sup>9</sup> Bodziak WJ, Footwear Impression Evidence, CRC Press, 2000, p 42-45, 169, 360.
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- <sup>11</sup> Willis WW, "The Expert Witness", Journal of Forensic Identification, 1993. 166/43.
- <sup>12</sup> Pagliaro EM, "The Most Common Questions Asked about Expert Witness Testimony", [www.forensicmag.com/articles/2013/08/](http://www.forensicmag.com/articles/2013/08/).



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**SEE ANSWER SHEET ON PAGE 151.**

- 1) Examples of civil cases include:
  - A) landlord and tenant disputes
  - B) divorce proceedings
  - C) property disputes
  - D) all of the above.
- 2) An example of trace evidence is:
  - A) serology
  - B) DNA
  - C) glass
  - D) blood stain
- 3) Lines of identification are agreed upon in which Level of Certainty?
  - A) III
  - B) II
  - C) I
  - D) IV
- 4) Foot zones are agreed upon in which Level of Certainty?
  - A) III
  - B) II
  - C) I
  - D) IV
- 5) 3-Dimensional impressions are NOT found in:
  - A) sand
  - B) dust
  - C) snow
  - D) soil
- 6) Which chemical reagent causes a light change instead of a color change?
  - A) DFO
  - B) Ninhydrin
  - C) Cyanoacrylate
  - D) Luminol
- 7) Cyanoacrylate fuming can further enhance visualization of foot prints with all of the following except:
  - A) Gentian violet
  - B) Ninhydrin
  - C) Rhodamine 6G
  - D) Ardrex 970-P10
- 8) When do foot/toe prints first appear?
  - A) at two years of age
  - B) at embryological 8th week
  - C) at embryological 20th week
  - D) at one year of age
- 9) To address the confusion in terminology such as possible, probable, etc., which methodology was devised?
  - A) Standards of Practice
  - B) Federal Rules of Evidence
  - C) Levels of Certainty
  - D) ACE-V
- 10) What is NOT in the Standards of Practice?
  - A) Primary duty is to the court
  - B) Maintain confidentiality
  - C) Must provide quality assurance of your work.
  - D) Must not change your opinion in the presence of new information.
- 11) Foot print impressions can be:
  - A) latent
  - B) plastic
  - C) visible
  - D) all of the above
- 12) The foot zone percentages that help to determine the height of the “unknown” individual:
  - A) Forefoot 40%
  - B) Forefoot 30%
  - C) Rearfoot 40%
  - D) Midfoot 40%
- 13) Which are different types of evidence in forensic sciences?
  - A) Real
  - B) Physical
  - C) Demonstrative
  - D) All of the above
- 14) What is the methodology (ACE-V) to evaluate evidence?
  - A) Assessment-Comparison-Examination-Verification
  - B) Analysis-Comparison-Examination-Veracity
  - C) Analysis-Comparison-Evaluation-Verification
  - D) Assessment-Contrast-Evaluation-Verification
- 15) Analysis in ACE-V is:
  - A) to determine similarities of evidence with known
  - B) to determine dissimilarities of evidence with known
  - C) to analyze random sampling
  - D) to determine if quality of evidence is reasonable to classify and evaluate.
- 16) Forensic podiatry falls under the main category of
  - A) Biology
  - B) Trace evidence
  - C) Physical evidence
  - D) Demonstrative evidence

*Continued on page 150*

17) Level of class characteristics is based on the forensic podiatrist's clinical knowledge and experience of:

- A) Morphology
- B) Biomechanics
- C) Pathology
- D) All of the above

18) Forensic podiatry

- A) Shows linkage of an individual to a crime
- B) Answers legal questions concerning foot function
- C) Identifies victims of mass disasters
- D) All of the above

19) Daubert Factors are applied to assess the reliability of testimony. Which is incorrect?

- A) The theory must be testable.
- B) The theory has to be peer reviewed and published.
- C) There may be an unknown error rate of the theory.
- D) There must exist standards and controls.

20) In forensic gait analysis what is to be taken into account from visualization of CCTV footage?

- A) The lighting
- B) The clothing of the individual
- C) The image flow
- D) All of the above

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**EXAM #1/15  
Forensic Podiatry  
(Kagan)**

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| 1. A B C D  | 11. A B C D |
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