AANA Journal Course
Update for Nurse Anesthetists

Acupuncture: History from the Yellow Emperor to Modern Anesthesia Practice

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Acupuncture and acupressure are components of Oriental medicine that have been in existence for thousands of years. These practices have transcended from Asia into Western culture. In the context of anesthesia practice, acupuncture and acupressure have demonstrated clinical usefulness in the perioperative setting. Acupuncture and acupressure can successfully decrease preoperative anxiety, decrease intraoperative anesthetic requirements, assuage postoperative pain, decrease the incidence of postoperative nausea and vomiting, and support chronic pain management.

Keywords: Acupressure, acupuncture, complementary and alternative medicine, Oriental medicine.

Objectives
At the completion of this course, the reader should be able to:

1. Describe the components of OM.
2. Describe preoperative research in support of acupuncture/acupressure.
3. Describe intraoperative research in support of acupuncture/acupressure.
4. Describe postoperative research in support of acupuncture/acupressure.
5. Identify areas where acupuncture/acupressure are used outside the OR.

Introduction
Complementary and alternative medicine (CAM) is described as "a group of diverse medical and healthcare systems, practices, and products that are not presently considered to be part of conventional medicine."1 CAM along with biomedicine is considered complementary, whereas CAM in lieu of biomedicine is considered alternative. Acupuncture and acupressure are a component of the CAM healthcare system, Oriental medicine (OM). This journal course provides an overview of OM and presents the history of acupuncture and acupressure. Additionally, it provides evidence-based support for acupuncture and acupressure in the context of anesthesia practice.

Oriental Medicine
OM is a CAM modality that has been an integral part of Eastern Asian culture for thousands of years. Acupuncturists are conventionally referred to as "practitioners of Oriental medicine."2 OM was founded on the traditions of Hindu (Ayurvedic), Arabic (Yunâni Tibbia), and Chinese medicine, which also has offshoots in Korea, Taiwan, Vietnam, and Japan. Traditional Chinese medicine, a well-known component of OM, arose from classical Chinese medicine.3 Traditional Chinese medicine was developed in the People's Republic of China in the 1950s and 1960s and is currently being taught in many US acupuncture schools.

OM is based on harmony, creating a balance between humans and the surrounding natural world. The National Center for Complementary and Integrative Health (formerly the National Center for Complementary and Alternative Medicine, or NCCAM) acknowledges that ancient teachings based on meridian theory and the flow of qi4 are difficult to reconcile with modern-day anatomy and neurophysiology; however, the National Institutes of Health (NIH) also maintains that evidenced-based support for acupuncture exists.1

History of Acupuncture
• China. Although the exact origin of acupuncture is unknown, it is believed the Zhou dynasty (first century

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3 Qi: natural energy, life force, or energy flow.

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BC) was the first civilization to use stone needles (Zhen Shi) to cure illnesses.\(^4\) The Yellow Emperor's Classic of Internal Medicine (Huang Ti Nei Ching Su Wen),\(^5\) the earliest medical textbook in the world, is considered the preeminent medical acupuncture book. The author is unknown; however, the book was discovered during the Han dynasty (100 to 121 AD), and it is accepted that the textbook was based on Chinese oral tradition preceding 1000 BC.\(^5\)

The Yellow Emperor's Classic of Internal Medicine\(^5\) is written as a dialogue between Emperor Huang Ti\(^6\) and his minister Ch'I Po, with the Emperor posing questions and the minister responding to the Emperor's questions. The Ling Shu section\(^6\) details yin\(^b\), yang\(^d\), and the process of acupuncture and moxibustion.\(^6\) A succeeding book, The Great Compendium of Acupuncture and Moxibustion, published during the Ming dynasty (1368-1644), offers the basis for modern acupuncture.\(^7\)

Acupuncture is not unique to China. There is evidence of references to acupuncture practices with stone, bone, metal, or bamboo needles in Eastern cultures as far back as the sixth century BC.\(^6\) Beyond Asia, evidence of acupuncture-related therapies have been discovered amongst the Eskimos, tribes in Brazil, and the South African Bantus.\(^8\)

- **India.** The ancient Indian text, the Vedas, composed 7,000 years ago in Vedic Sanskrit, mentions Ayurvedic medicine and needle therapy. Ayurvedic acupuncture (Bhedankarma) or “piercing through treatment” was originally practiced by Buddhist monks and the Fourth Shastra, written by the Buddha, states that Tibet adopted acupuncture from India.\(^9\)(pp 341) Many of the original Ayurvedic techniques are not globally known because the ancient texts are not available to Western scholars.\(^9\)

- **Japan.** Japanese acupuncture is directly based on Chinese science.\(^4\) Acupuncture first came to Japan via the Silk Roads\(^f\) from Chinese monks.\(^10\) In 443 AD, Japanese acupuncture flourished under Emperor Yinkyo. In the 17th century, Dutch living in Japan as part of the Dutch East India Company first learned of acupuncture and conveyed these techniques to the West via Holland. In 1680, Willem ten Rhijne, a Dutch physician for the French, is considered the pioneer of Western acupuncture.\(^4\) His book, L'Acupuncture Chinoise (Chinese Acupuncture) has been widely used by Western providers in both Europe and abroad.\(^4\)

**Modern Acupuncture History**

- **International History.** Although acupuncture surged in Europe during the 20th century, its use in China had been suppressed with the advent of Western medicine until the 1940 Communist revolution. During this period, Chairman Mao Tse-tung demanded a resurgence of traditional Chinese medicine in the People's Republic of China in response to the lack of Western pharmaceuticals.\(^9\) This led to publication of The Barefoot Doctor's Manual, a resource for providing traditionally based medical care in rural areas.\(^9\)

Once Allied Forces conquered Japan in 1945, the general headquarters demanded that the Japanese cease using acupuncture. Instead of terminating practices, the Japanese physicians pleaded with the headquarters and eventually succeeded in keeping their practices. This led to the formation of a law in 1948 making acupuncture a permanent part of Japanese medical practice.\(^10\)

Modern acupuncture research began in 1949 in the People's Republic of China. In the 1950s, the Soviet Union began to explore acupuncture, although research from both geographic regions remained unknown to Western scientists and physicians.\(^11\)

- **US History.** In 1971, James Reston, a New York Times reporter, underwent an appendectomy in China while covering President Nixon’s diplomatic visit. Acupuncture was used to successfully treat his postoperative pain. Reston’s article\(^12\) in the New York Times first introduced the United States to the concept of acupuncture. In 1972, the NIH awarded its first grant to study acupuncture and in 1996, the US Food and Drug Administration Code of Federal Regulations approved acupuncture needles as medical devices, where they currently maintain a Class II (Special Controls) classification.\(^13\) Currently there are 18,000 licensed acupuncturists in the United States.\(^14\)

The National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM) is the US governing body that certifies acupuncturists and practitioners

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\(^{b}\) Emperor Huang Ti (2697-2597 BC) is referred to as the “Yellow Emperor.” He is considered the founder of Chinese civilization.\(^5\)(p5)

\(^{c}\) Yin: cold, passive elements.

\(^{d}\) Yang: hot, active elements.

\(^{f}\) A traditional Chinese medicine using moxa from dried mugwort (a medicinal plant used in traditional Chinese medicine, Japanese, and South Korean traditional medicine).

\(^{f}\) A mercantile trade route connecting the East and West, commonly referred to as the Silk Road because of the prevalence of silk trade.
of Oriental medicine. In February 2013, the NCCAOM submitted a petition to the Obama administration to designate acupuncturists as recognized healthcare providers under the Social Security Act.15

The former NCCAM1 completed 45 clinical trials examining the impact of acupuncture on conditions such as peripheral neuropathy in patients with human immunodeficiency virus as well as chronic pain, fibromyalgia, colon cancer, arthritis, posttraumatic stress disorder, and cardiovascular disease. Despite this research, none of the NIH-supported studies focused on acupuncture and acupressure in the context of anesthesia practice.

• Veterinary History. Acupuncture also has roots in veterinary medicine. The first mention of equine acupuncture was in Bai-Le’s Cannon of Veterinary Medicine written in 650 BC.16 Since then, acupuncture has diffused into veterinary medicine and is used to supplement local anesthesia cases and to decrease anesthetic requirements for animals undergoing general anesthesia.17 International and US veterinarians have used acupuncture to successfully treat bovine reproductive disorders; canine lameness or paralysis; and equine back pain, colic, and chronic diarrhea.17

Evidence-Based Support in the Context of Anesthesia Practice

The following section provides a review of anesthesia-related acupuncture and/or acupressure articles, including perioperative anesthesia management, and chronic pain management. Perioperative management is delineated by preoperative, intraoperative, and postoperative areas.

Acupuncture has minimal to no side effects; the rate of adverse events with acupuncture is reported as 0.0001.18 Only current articles from the past 10 years were included in the analysis.

• Preoperative Management. When administered preoperatively, acupuncture and acupressure can exhibit anxiolytic properties and may contribute toward an intraoperative decrease in bispectral index (BIS) values.

• International Literature. Fassoulaki et al19 conducted 2 Greek studies examining the effect of acupressure on the Extra 1 acupointg (an acupoint is another name for an acupuncture point) and its ability to decrease preoperative anxiety. Results demonstrated a 50% reduction in BIS values and preoperative anxiety when acupressure on the Extra 1 acupoint was applied for 10 minutes.19 These results were replicated and confirmed in India by Agarwal et al.20 In Iran, Valiee et al 21 concluded that acupressure at true points (third eyeh and Shen Men) can decrease preoperative anxiety. True points refer to known acupoints vs sham treatment, in which patients receive treatment on nonacupoints.

• US Literature. A CAM study by Yale-New Haven Hospital revealed that, if available, 42% of patients would use acupuncture to decrease preoperative anxiety.22 Wang et al23 discovered that acupressure in the Extra 1 (Yintang) point produced a statistically significant (P = .012) decrease in preprocedural anxiety. Also, 2 US studies revealed that acupuncture and acupressure may decrease a parent’s anxiety before their child’s surgery.24,25 However, with both of these studies the acupuncture or acupressure was administered to

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Table 1. Review of Preoperative Anxiety Literature

<table>
<thead>
<tr>
<th>Country</th>
<th>Author</th>
<th>Year</th>
<th>AC/AP/Both</th>
<th>Study design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>Acar et al26</td>
<td>2013</td>
<td>AC (Yintang)</td>
<td>RCT (n = 52)</td>
<td>AC decreased BIS values (P &lt; .0004) and anxiety (P = .018)</td>
</tr>
<tr>
<td>Iran</td>
<td>Valiee et al21</td>
<td>2012</td>
<td>AP (third eye and Shen Men)</td>
<td>RCT (n = 70)</td>
<td>AP decreased preoperative anxiety (P &lt; .01)</td>
</tr>
<tr>
<td>USA</td>
<td>Yip et al25</td>
<td>2009</td>
<td>AC</td>
<td>Literature review (n = 17 trials)</td>
<td>Children of parents receiving acupuncture were less anxious during induction (95% CI = 3.49-30.51) and children were more cooperative (RR = 0.63, CI = 0.4-0.99)</td>
</tr>
<tr>
<td>USA</td>
<td>Wang et al23</td>
<td>2008</td>
<td>AP (Extra 1)</td>
<td>RCT (n = 52)</td>
<td>AP decreased anxiety in children undergoing endoscopic procedures (P = .012)</td>
</tr>
<tr>
<td>Greece</td>
<td>Fassoulaki et al19</td>
<td>2007</td>
<td>AP (Extra 1)</td>
<td>Pilot study (n = 12)</td>
<td>AP decreased BIS values (P = .0001) and stress (P = .008)</td>
</tr>
<tr>
<td>India</td>
<td>Agarwal et al20</td>
<td>2005</td>
<td>AP (Extra 1)</td>
<td>RCT (n = 76)</td>
<td>AP decreased preoperative anxiety and BIS values (P &lt; .001)</td>
</tr>
<tr>
<td>USA</td>
<td>Wang et al24</td>
<td>2005</td>
<td>AP (Yintang)</td>
<td>RCT (n = 61)</td>
<td>AP decreased parental anxiety (P = .03) before their children’s surgery</td>
</tr>
</tbody>
</table>

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8 Extra 1 acupoint is located midway between the medial ends of the two eyebrows.

9 Third eye is also referred to as Yintang or Extra 1 acupoint. In this study, the sham point was the external corner of the left eyebrow.
the parents and not the patient (the child) receiving the anesthetic. Therefore, they reflect an ability to decrease parental anxiety, yet they are not representative of acupuncture or acupressure’s effect on an anesthetic. Table 1 depicts the international and domestic review of literature pertaining to preoperative anxiety.19-21,23-26

- **Intraoperative Management.** Several foreign studies have used acupuncture intraoperatively.

  - **International Literature.** In 2012, Yang et al.27 conducted a controlled trial examining the impact of acupuncture on decreasing anesthesia requirements in ASA physical status 1 to 2 patients undergoing elective gynecologic laparoscopic cases. Ninety patients were enrolled in the study. Compared with the control group, the acupuncture group required 25% to 35% less sevoflurane (P < .05), leading to a faster emergence from anesthesia and decreased postoperative nausea and vomiting (PONV).

    In China, Wu et al.28 conducted a randomized control trial of 40 patients undergoing laparoscopic cholecystectomy to examine acupuncture’s impact on hemodynamics. Mean arterial pressure, heart rate, and saturation of blood oxygenation (SpO₂) were all measured. Hemodynamic measurements were significantly more stable in the acupuncture group (P < .05). Also, in China, Xu and Fang29 conducted a controlled trial looking at acupuncture anesthesia and its use in conjunction with transrectal ultrasound-guided prostate biopsies via the perineum. Visual analogue scores were measured for 105 cases. Hemodynamics (mean arterial pressure and heart rate) were more stable in the acupuncture group than in the control group (P < .05).

  - **US Literature.** Currently, there are no US studies examining the impact of acupuncture and acupressure on intraoperative anesthesia management. Table 2 provides an overview of international studies examining the effect of acupuncture on intraoperative anesthetic and opioid requirements.27-29

- **Postoperative Management.** Acupuncture-assisted postoperative management of nausea and vomiting, and pain is addressed here.

  - **Postoperative Nausea and Vomiting.** PONV occurs with an incidence of 30% after elective cases and up to 80% in high-risk patients.30 This problem prolongs hospital stay and may lead to dehydration and metabolic disturbances. Many pharmacologic treatments are expensive and only partially effective in preventing PONV, and may carry their own side effects such as sedation, a propensity toward headaches, and extrapyramidal symptoms.30

Table 2. Review of Intraoperative Acupuncture Literature

<table>
<thead>
<tr>
<th>Country</th>
<th>Author</th>
<th>Year</th>
<th>AC/AP/Both</th>
<th>Study design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Yang et al27</td>
<td>2012</td>
<td>AC (Han’s acupoint)</td>
<td>RCT (n = 90)</td>
<td>AC decreased sevoflurane requirements 25%-35% (P &lt; .05)</td>
</tr>
<tr>
<td>China</td>
<td>Wu et al28</td>
<td>2011</td>
<td>AC</td>
<td>RCT (n = 40)</td>
<td>AC provided more hemodynamic stability than the control group (P &lt; .05)</td>
</tr>
<tr>
<td>China</td>
<td>Xu and Fang29</td>
<td>2010</td>
<td>AC (ST 36)</td>
<td>RCT (n = 105)</td>
<td>AC provided better pain scores and more stable hemodynamics (P &lt; .01)</td>
</tr>
</tbody>
</table>

**Figure.** P6 Acupuncture Point, or Acupoint
graphic and procedural factors; however, both acupuncture and acupressure can effectively decrease PONV by statistically significant levels.33-35

**US literature:** In the United States, White et al30 revealed that wearing an acupressure band (P6 band) decreases the incidence of PONV from 30% to 12%. Additionally, Gan et al36 found that in addition to providing PONV prophylaxis, simulating acupoint P6 provided the added benefit of analgesia. Table 3 reviews PONV literature, both international and domestic.30-33,36-38

- **Postoperative Pain Management.** Postoperative pain management is improved with acupuncture use.

**International literature:** Postoperative acupuncture leads to decreased opioid requirements and improved relaxation.39-41 Sun and colleagues42 found that opioid-sparing effects such as a decrease in postoperative nausea, dizziness, sedation, and urinary retention were clinically meaningful in patients in the acupuncture group.

**US literature:** Lin et al43 reported that intraoperative acupuncture decreases postoperative agitation and pain requirements by up to 57% in children after bilateral myringotomy and insertion of tympanostomy tubes. A review of postoperative pain literature, both international and domestic, can be found in Table 4.39-43

- **Acute and Chronic Pain Management.**

**International Literature.** Clinical trials from the World Health Organization (WHO) demonstrate that acupuncture is an effective treatment of pain.44 In Israel, 7.1 million Israelis use CAM, and all 4 of Israel’s health maintenance organizations offer CAM treatments as part of their medical plans.45

- **US Literature.** The US military has been the driving force of acupuncture use for acute and chronic pain management in the United States. In 2001, Dr Niemtzow,46 a military physician, developed a specific form of auriculotherapy using points on the ear that anatomically correspond to areas of the body. He advanced the therapy called battlefield acupuncture in hopes that this quick and simple form of acupuncture could be easily accessed and used on the military battlefield. Stateside, battlefield acupuncture is currently used by the US military to treat conditions such as pain, obesity, smoking, skin disorders, dystonia, and vertigo.46

Chen47 concludes that acupuncture provides a cost-effective and successful treatment of chronic back pain, neck and shoulder pain, lower back pain, and headaches. Table 5 provides a review of the literature on acupuncture-supported acute and chronic pain management.48,49

### Conclusion

Acupuncture and acupressure have demonstrated clinical usefulness and received governmental support, but have not yet transcended into mainstream US anesthesia practice. Alternative medicine modalities may provide a cost-effective complement to drug shortages,38 as out-of-pocket expenses for CAM are less than prescription drugs.30 However, while acupuncture and acupressure

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<th>Study design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>Noroozinia et al37</td>
<td>2013</td>
<td>AP (Nei-Guan acupoint)</td>
<td>RCT (n = 152)</td>
<td>AP reduced incidence of nausea and vomiting in patients undergoing cesarean delivery from 35.5% to 12.2% (P &lt; .001)</td>
</tr>
<tr>
<td>Sweden</td>
<td>Holmér Pettersson and Wengström33</td>
<td>2012</td>
<td>Both</td>
<td>Literature review (n = 21)</td>
<td>AC prevents PONV with minimal side effects</td>
</tr>
<tr>
<td>USA</td>
<td>White et al30</td>
<td>2012</td>
<td>AP (device)</td>
<td>RCT (n = 100)</td>
<td>AP decreased vomiting in the first 24 h (P = .04); vomiting at 0-72 h decreased from 30% to 12% (P = .03)</td>
</tr>
<tr>
<td>Egypt</td>
<td>El-Deeb and Ahmady38</td>
<td>2011</td>
<td>AC</td>
<td>RCT (n = 450)</td>
<td>AC decreased PONV (P = .001) in parturients during their cesarean delivery</td>
</tr>
<tr>
<td>Norway</td>
<td>Liodden et al31</td>
<td>2011</td>
<td>Both (preoperative AC and postoperative AP band)</td>
<td>RCT (n = 154)</td>
<td>Perioperative AC and postoperative AP led to approximately 20% less retching and vomiting (P = .015)</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Lee and Fan32</td>
<td>2009</td>
<td>AC (P6)</td>
<td>Literature review (n = 40)</td>
<td>AC reduced nausea (RR = 0.71, 95% CI = 0.61-0.83), vomiting (RR = 0.70, 95% CI = .59-0.83), and the need for rescue emetics (RR = 0.69, 95% CI = 0.57-0.83)</td>
</tr>
<tr>
<td>USA</td>
<td>Gan et al36</td>
<td>2004</td>
<td>AC (Electro)</td>
<td>RCT (n = 77)</td>
<td>AP as effective as ondansetron for preventing PONV (P = .01)</td>
</tr>
</tbody>
</table>

**Table 3. Review of Postoperative Nausea and Vomiting (PONV) Literature**

Abbreviations: AP, acupressure; AC, acupuncture; RCT, randomized controlled trial; RR, relative risk.
may assist in assuaging preoperative anxiety, PONV, and postoperative pain, more research, especially in the United States, is warranted. This article provides a review of acupuncture and acupressure’s history and presents evidence-based support of the role these modalities may play in anesthesia management.

For further information about obtaining acupuncture/acupressure licensure, please visit the National Certification Commission for Acupuncture and Oriental Medicine website at http://www.nccaom.org/.

REFERENCES


Table 4. Review of Postoperative Pain Literature

<table>
<thead>
<tr>
<th>Country</th>
<th>Author</th>
<th>Year</th>
<th>AC/AP/Both</th>
<th>Study design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Arai et al39</td>
<td>2013</td>
<td>AC (auricular); after hemicolectomy</td>
<td>RCT (n = 26)</td>
<td>AC provided postoperative relaxation to patients</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Chang et al40</td>
<td>2012</td>
<td>AC (auricular); total knee replacements</td>
<td>RCT (n = 62)</td>
<td>AC led to decreased opioid use (P &lt; .05) and an improvement in passive knee motion (P &lt; .05)</td>
</tr>
<tr>
<td>USA</td>
<td>Lin et al43</td>
<td>2009</td>
<td>AC (LI-4 He Gu and HT 7 Shen Men)</td>
<td>RCT (n = 60)</td>
<td>AC decreased postoperative agitation and decreased pain requirements by 57% (P &lt; .001) in children</td>
</tr>
<tr>
<td>Germany</td>
<td>Sun et al42</td>
<td>2008</td>
<td>AC</td>
<td>Literature review (n = 15)</td>
<td>AC decreases pain intensity at 8 and 72 h; decreases nausea (RR = 0.67, 95% CI = 0.53-0.81), dizziness (RR = 0.65, 95% CI = 0.52-0.81), sedation (RR = 0.78, 95% CI = 0.61-0.99), pruritus (RR = 0.75, 95% CI = 0.59-0.96), and urinary retention (RR = 0.29, 95% CI = 0.12-0.74). Morphine-sparing effect of 21%.</td>
</tr>
<tr>
<td>China</td>
<td>Wong et al41</td>
<td>2006</td>
<td>AC (Electro)</td>
<td>Pilot study (n = 27)</td>
<td>AC decreased patient-controlled analgesia/morphine use (P &lt; .05)</td>
</tr>
</tbody>
</table>

Table 5. Review of Acute and Chronic Pain Literature

<table>
<thead>
<tr>
<th>Country</th>
<th>Author</th>
<th>Year</th>
<th>AC/AP/Both</th>
<th>Study design</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>Hjelmstedt et al48</td>
<td>2010</td>
<td>AP</td>
<td>RCT (n = 71)</td>
<td>AP reduced labor pain (P &lt; .001) during active phase of labor</td>
</tr>
<tr>
<td>USA</td>
<td>Goertz et al49</td>
<td>2006</td>
<td>AC (auricular)</td>
<td>Pilot study (n = 87)</td>
<td>AC provided a 23% reduction in pain before patient left the ER (P &lt; .0005)</td>
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AUTHOR
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DISCLOSURES
The author has declared no financial relationships with any commercial interest related to the content of this activity. The author did not discuss off-label use within the article.

ACKNOWLEDGMENT
The author thanks the AANA Foundation, Park Ridge, Illinois, for its support of this research.