

## Youth and Tattoos: What School Health Personnel Should Know

Kelli McCormack Brown, Paula Perlmutter, Robert J. McDermott

---

**ABSTRACT:** *Though tattooing has been practiced by various cultures for centuries, this art form has undergone dramatic changes the past few decades. Today, tattoos appeal to diverse populations and mainstream culture. The proliferation of tattooing prompted increased concern for safety and awareness of hazardous conditions. Transmission of infectious diseases, such as hepatitis B and C, and theoretically, HIV, can occur when proper sterilization and safety procedures are not followed. While there are many populations at risk, a critical at-risk group is adolescents. Tattooing among adolescents is a risk-taking behavior that warrants the attention of health education in assisting adolescents in becoming informed decision-makers. Teaching and advocacy strategies are suggested, and roles for school health personnel are presented. (J Sch Health. 2000;70(9):355-360)*

---

Various cultures worldwide have performed tattooing for thousands of years.<sup>1</sup> Sailors traveling through the Polynesian islands during the 17th and 18th centuries recorded extensive tattooing on both men and women. The earliest known examples of tattooing come from 12th century Egypt. Tattooing was widely practiced in Micronesia, India, Burma, and Japan. The Polynesian word "tatau" is the stem of the English word tattoo.<sup>2</sup> Tattooing increased in popularity during the 19th century in the United States and Britain. This increase is attributed in part to the invention of the electric tattoo machine in the early 1890s that made the practice more efficient and accessible.<sup>3</sup>

The cultural status of tattooing evolved steadily from an antisocial activity in the 1960s to a trendy fashion statement of the 1990s.<sup>4</sup> As a well-established art form, tattooing has undergone dramatic changes the past three decades. In the 1970s, artists trained in traditional fine art disciplines began to embrace tattooing and brought with them sophisticated imagery and techniques.<sup>4</sup>

Tattoos were adopted and prominently displayed by rock stars such as the Rolling Stones in the early 1970s,<sup>4</sup> and by the late 1980s tattoos had become accepted by even mainstream society.<sup>5</sup> Because tattoos have broader appeal than ever before, tattoo parlors are experiencing a growth trend. Three major changes in the tattoo industry contribute to this art form: a wider variety of tattoo ink colors; the entry into the field of skilled artists; and the proliferation of celebrity tattoos.<sup>4</sup>

Today, tattoos are routinely seen on rock stars, professional sports figures, fashion models, and movie stars.<sup>4</sup> In Western society, approximately 3% to 5% of the population has one tattoo, with the number of new tattoos increasing.<sup>6</sup>

Among soldiers in the US Army, more than one-third (36%) are tattooed, with 22% possessing three or more tattoos.<sup>7</sup> In the United States, tattooing was the sixth fastest-growing retail business in 1996, after the Internet, paging services, bagel stores, computer retail outlets, and cellular phone stores. An estimated 15,000 tattoo studios currently are in operation.<sup>4</sup> Some authorities estimate that almost 20 million Americans have tattoos, more than 13% of the population.<sup>8,9</sup> Although popular belief associates tattoos more with males than females, a 1991 report estimated that about one-half of new tattooing is performed on women, including those in business and other professional areas.<sup>10</sup>

Every culture creates a concept of the "natural body," and each modifies it through piercing, painting, and hairstyles.<sup>11</sup> As societies grow more complex and the division of economic and social labor becomes refined, tattooing becomes more a matter of individual choice and serves the purpose of self-expression.

Temporary and permanent tattoos are subject to regulation, as are cosmetics under the jurisdiction of the US Food and Drug Administration (FDA). However, state and local agencies hold direct jurisdiction over the practice of tattooing by tattoo artists and technicians.<sup>12</sup> The safety of tattoos, tattoo removals, adverse reactions to tattoos, and infections that result from a tattoo are being evaluated by the FDA.<sup>12</sup> Of the 18 states with current state regulation information, only three states (Massachusetts, Oklahoma, South Carolina) prohibit tattooing of all sorts.<sup>13</sup> Several authorities confirm the need for health education concerning the risks and safety associated with tattooing.<sup>7,14-16</sup>

### HEALTH RISKS

Even in modern facilities, tattooing is not without risks. The two most significant risks include exposure to blood borne pathogens and allergic responses to the pigments. Unsterile tattooing equipment and needles can transmit infectious disease.

### Hepatitis B and C

The most documented infection transmitted through the

---

*Kelli McCormack Brown, PhD, FAAHE, FASHA, CHES, Associate Professor (kmbrown@hsc.usf.edu); Paula Perlmutter, MPH, Research Assistant; and Robert J. McDermott, PhD, FAAHB, FASHA, Professor and Chair, Dept. of Community and Family Health, Florida Prevention Research Center at the University of South Florida, College of Public Health, 13201 Bruce B. Downs Blvd., Tampa, FL 33612-3805. This article was submitted November 23, 1999, and revised and accepted for publication May 30, 2000.*

tattoo process in the 20th century is hepatitis.<sup>17</sup> Hepatitis, due to hepatitis B virus (HBV) in most cases, has been reported in tattoo-related outbreaks since 1950.<sup>3</sup> In most reported cases, the tattooist responsible for these cases used the needle for several customers without adequate sterilization. Often, the same ink receptacles were used for all customers.<sup>3</sup> The number of adverse reactions is underreported, and even when reports are received, they may not be easy to verify. As a means of preventing HBV, the American Public Health Association<sup>18</sup> (APHA) recommends that tattooing be discouraged. In addition, APHA recommends that any blood donated by individuals tattooed in the previous six months be screened for the presence of HbsAg by sensitive RIA or EIA tests.<sup>18</sup>

Hepatitis C (HCV) infection is the most common blood borne infection in the United States, with most infected individuals under the age of 50.<sup>19</sup> According to 1996 estimates by the Centers for Disease Control and Prevention<sup>20</sup> (CDC) approximately 36,000 new cases occur in the United States each year. Between 25% and 30% of HCV infections are asymptomatic. Moreover, the prevalence is estimated to be 3.9 million cases, or just under 2% of the population.<sup>20</sup> Treatment is effective in between 10% and 40% of persons.

HCV has been associated with tattooing in several recent studies. Tattooing was related to an increased anti-HCV seroprevalence in Taiwan, showing a multivariate odds ratio of 2.2.<sup>21</sup> Another Taiwan-based study of drug abusers showed tattooing as a risk factor independently related to HCV.<sup>15</sup> In their southwestern United States case-control study, Balasekaran et al<sup>22</sup> also highlighted tattooing as a risk factor for sporadic HCV. In an Italian study, Brusaferrro et al<sup>23</sup> likewise found tattooing to be a significant risk factor in HCV transmission. In a Brazilian investigation, tattooing was the only risk factor for parenterally transmitted HCV.<sup>24</sup> In Australia, Wong et al<sup>25</sup> found tattooing to be associated with HCV antibody-positive blood donors. In a Canadian study of blood donors, multivariate analysis showed tattooing to be one of five factors associated with anti-HCV positivity (OR=5.7; 2.5-13).<sup>26</sup> The Balasekaran et al study<sup>22</sup> in New Mexico aside, earlier published reports show no relationship between tattooing and HCV infection in the United States, leaving the matter open to controversy for US residents.<sup>19,27,28</sup>

Even in the presence of proper sterilization, studies suggest that tattooing ink can become contaminated and transmit HCV.<sup>29</sup> Though most regulated and professional tattooists now take precautions to avoid exposing customers to HBV and HCV from contaminated needles, ink receptacles, or the tattooist's hands, such precautions may not be observed when tattoos are obtained from less-skilled acquaintances, in unregulated tattooing establishments, or on the streets.

The CDC<sup>30</sup> does identify nonessential percutaneous exposures such as tattooing and body piercing as primary prevention strategies for eliminating or reducing the occurrence of HCV, and CDC acknowledges the validity of a relationship between HCV and tattooing in other countries. The CDC prevention and control strategies stop short of recommending routine HCV testing for persons in the United States, although these prevention and control strategies were published a year prior to the emergence of Baleskakaran et al's<sup>22</sup> New Mexico data.

## HIV

Injection drug users (IDUs) use hollow medical syringes and needles to inject drugs directly into the bloodstream. It is common practice to withdraw a little blood back into the syringe to delay the onset of the high. When needles are passed from IDU to IDU and reused without sterilization, some of the blood remains in the syringe and is passed on to the next user. Tattooing is different from injecting drugs. The needles used in tattooing are not hollow, but they do travel back and forth through a hollow tube that acts as an ink reservoir. The tip of the tube is dipped into the ink, which draws it into the tube. The needle pierces the skin after it is coated with the ink. The tattoo recipient then bleeds a little through the needle hole. One is only at risk of infection if he or she comes in contact with infected blood. Therefore, transmission of HIV becomes possible when tattooing tools are infected and equipment is not sterile. The tattooist is at greater risk, since he or she has to touch the tattoo recipient's blood.

Evidence indicates that infection may require a relatively substantial amount of fluid to be passed. A pinprick almost certainly is not adequate to initiate infection. HIV is a fragile virus that cannot survive long outside the human body and is easily destroyed by autoclaving.<sup>31</sup> If the tattooist maintains sterile conditions and procedures, almost no risk of infection exists. According to CDC,<sup>31</sup> no cases of HIV transmission through tattooing have been confirmed in the United States since tracking began in 1985.

Figure 1  
Teaching Strategies

- **Informal group discussions** in health classes that will allow students to share personal experience and knowledge regarding tattoos. Such discussions will allow the teacher to gain insight into the group's knowledge and misperceptions about tattooing. Students may find that others have the same questions and share their same concerns.
- A **formal classroom presentation** that focuses on tattoo facts either delivered by the teacher, health care provider, or health educator. Classroom presentations may focus on infection control and determining whether the tattoo parlor is safe and reliable. Keep the formal presentation short and allow students ample opportunity to ask questions and share personal experiences. It will be important to keep an open-mind and not be judgmental.
- **Informal one-on-one conversations** provide students who may be too shy to ask questions in a classroom setting, an opportunity to receive desired information about tattooing.
- In addition, both formal and informal class discussions can sort out the normative beliefs and separate fact from myth where tattoos are concerned.

Adapted from: Armstrong ML, Ekmark E, Brooks B. Body piercing: promoting informed decision making. *J Sch Nurs*.1995;11(2):20-25.

Nevertheless, some authorities argue that tattooing is a theoretically plausible HIV transmission vector and, therefore, should receive greater attention in the prevention literature.<sup>14</sup>

### Allergic Responses and Infections

Compounds used as pigments range from metal oxides containing iron, mercury, chromium, cadmium, and cobalt to synthetic organic dyes.<sup>32</sup> Though the incidence rates are low, cases of hypersensitivity to pigments resulting in allergic responses have been reported.<sup>12</sup> Localized symptoms of edema, erythema, and pruritis can occur in sensitive individuals, and may be severe enough to require removal of the tattoo.<sup>32</sup>

The inks, or dyes, used for tattoos are considered "color additives" under the Federal Food, Drug, and Cosmetic Act.<sup>12</sup> The FDA may have to evaluate its role in the regulation of tattoo ink since tattoo pigments have no current approval process, and the purity and identity of some pigments is unknown.<sup>33</sup> To track tattoo-related infections, studios must keep a record for each client including the pigments used and the pigment manufacturer. This practice, if it takes place at all, is rare.

Occurrence of infections other than hepatitis due to tattooing is not well documented, but is probably underexamined. Chowfin et al<sup>34</sup> found a patient with a spinal epidural abscess following tattooing. Cetta et al<sup>35</sup> reported that antibiotics were not administered prior to, or during, the tattooing process for any of the 152 tattooed persons they studied. Although no infections were reported in these patients, a concurrent survey of physicians revealed that 60% believed that antibiotic prophylaxis is warranted. These authors concluded that since the popularity of tattooing appears to be rising, further study is needed to examine the extent to which persons receiving tattoos experience any serious sequelae.

Figure 2  
Advocacy Strategies

- Educate state and local legislators regarding the potential health risks of tattooing.
- Educate state regulators and those in the state bureau of licensed professions about the importance of licensing tattooists. Provide sample legislation.
- Prepare a variety of "Tattoo Fact Sheets" that can be distributed to different audiences (eg, school health educators, legislators, and health care professionals).
- Put the issue of tattoos and youth on the agendas at national health and education meetings (eg, American School Health Association, American Public Health Association, National Education Association, National Nursing League).
- Work with existing community-based coalitions that are interested in youth and/or adolescent health issues to bring this issue to the forefront in their community.
- Work with youth-based organizations to write movie studios indicating they will "boycott" movies that glamorize stars with tattoos.
- Work with local media (eg, newspapers, TV, radio and cable) to feature informed decision making regarding youth and tattoos.

## YOUTH:

### A POPULATION AT SPECIAL RISK

Although there are a number of at-risk population groups, such as gang members and incarcerated criminals, and an increased prevalence of tattoos among suburban women, a critical at-risk group is youth. Youth, perhaps more easily influenced by media, peers, and other factors, may not understand the long-term health risks of receiving a tattoo and its permanent disfigurement of the skin. Documentation of health-related risk taking by youth could almost be characterized as plethoric. Despite this abundant adolescent health literature base, little of it focuses on tattooing, body piercing, or other forms of body art.<sup>14,16</sup> Some authorities suggest that there is more information about these topics on the Internet than there is published research in the scholarly health care literature.<sup>36,37</sup> Despite the popularity of body art among adolescents, and the potential for occurrence of mild to serious infection, no related items are included on such surveillance instruments as the CDC's Youth Risk Behavior Survey (YRBS). Although the YRBS includes items related to sexual practices and exposure to sexually transmitted infections (STIs), no reference is made to HBV or HCV, both of which can be chronic, and even fatal.

Youth are commonly identified as society's risk takers,<sup>38</sup> and the adolescent years are filled with psychosocial pressures, biological turmoil, and struggles for independence.<sup>39</sup> Adolescents are trying to describe who they are and what they want to become. The adolescent's appearance becomes a means of communication, a sort of language to express self-identity.<sup>16</sup> However, the permanent status of tattoos carries the potential for long-term risks.<sup>8</sup> Though risk taking may be a natural part of adolescent transition, it can be harmful when associated with impulsive energies, lack of insight about potential adverse effects, or the need for thrill-seeking.<sup>40</sup>

Armstrong and McConnell<sup>8</sup> queried 642 adolescents in Texas, 105 of whom were tattooed. Of those youths tattooed, the average age for the first tattoo was 14 years with the earliest tattooing at 10 years of age. Three areas of risk were investigated: risks of purchase; risks of possession; and health risks including potential diseases, allergies, or infections. No health problems were documented, but the potential transmission of blood-borne diseases existed because 70% reported some hemorrhaging during the tattooing procedure. Forty-five percent of the tattooed adolescents labeled themselves "risk takers."<sup>8</sup> Among all tattooed adolescents, 52% obtained their tattoos from a studio. Straight pins or sewing needles, pens, pencils, or homemade devices were used for amateur tattooing and many were done in the home. The authors of the study concluded that adolescents who want a tattoo will obtain one regardless of money, regulations, or risk. Moreover, the decision to obtain one is made for self-identity, and often on impulse.<sup>8</sup>

Eighty youth between 6 and 17 years of age were interviewed in focus groups regarding their attitudes toward tattoos and their normative beliefs about health and health behavior, awareness of long-term consequences of tattooing, and stigmatization.<sup>41</sup> Data analysis revealed that the youth were knowledgeable about tattoos and the process, and were aware of potential health risks. For the most part, attitudes about tattoos were negative; however, a positive

attitude among females was held toward small tattoos. Participants also discussed that due to the permanence of tattoos they might regret them later in life. The authors<sup>41</sup> indicate an "urgent need for research on prevention of unsafe use of tattooing and piercing implements."

Houghton, Durkin, and Turbett<sup>42</sup> interviewed 202 tattooed people to investigate their motives, the social consequences they experienced, and whether they regretted their decision to become tattooed. Most of those surveyed received their tattoo at a professional studio (78%), 9.5% obtained one through friends or family, 8.5% were self-administered, and 4% were obtained from "backyard establishments." More than one-fourth (27.5%) of those interviewed had actively sought tattoo removal. Although only a minority of those interviewed obtained tattoos through nonprofessionals, in doing so, they exposed themselves to greater risk than those who obtained tattoos from professional studios, where sterilization procedures are more likely to be followed.<sup>42</sup>

Most adult tattooing is performed in a studio. Since youth are often restricted by financial resources, they are more likely to turn to amateur tattooists. For young people ages 10 to 14 with fewer financial resources and limited access to transportation, the usual manner is self-administered or friend-administered amateur tattooing.<sup>40</sup> Often, these tattoos are blue or black, crude, simplistic, uneven drawings.<sup>40</sup> Various instruments such as pencils, pens, and pins and pigments such as India ink, carbon, and charcoal are frequently used. Older youth ages 14 to 18 who want to obtain a tattoo have more options with increased availability of discretionary money and cars. The major concern with studio tattooing focuses on non-licensed artists who may be inconsistent with respect to needle and other instrument sterilization.<sup>40</sup>

### SAFETY ISSUES IN OBTAINING A TATTOO

Historically, tattoo parlors often operated without concern for the health and safety of those receiving a tattoo. In the mid-1960s tattooing was banned in New York City after an outbreak of hepatitis B was traced to unsterilized equipment in tattoo parlors. To improve health and safety, the Alliance of Professional Tattooists (APT) adopted and revised a curriculum developed by the US Department of Health and Human Services for personal service workers, including the special needs of tattoo artists. The curriculum consists of five sections (microbiology, immunization, sterilization and disinfection, blood borne pathogen standards, and summary).

Tattooing, if performed in a professional studio, begins with the selection of a design. Before beginning a tattoo, the tattooist inspects the customer's skin to make sure there are no open cuts or scrapes. After the tattooist has drawn or stenciled the design onto the skin, a thin layer of petroleum jelly or a similar substance is spread over the site to be tattooed.

Most professional tattooists use an electric tattoo gun that consists of a rotating motor in a handle connected to a bar that runs through a shaft to the needles. One to 14 needles are used, depending on the thickness of the line or shading desired. The needles protrude only a couple of millimeters from the tubes, so they do not penetrate deeply into the skin. The end of the needle tube is dipped in a

small amount of ink. As the tattooist guides the machine over the skin, the needle moves up and down, puncturing the skin several hundred times per minute. Excess ink and the small amount of blood that oozes from the site are repeatedly wiped away. Depending on the size and complexity of the tattoos, the process can take from 15 minutes to several hours, or can even be performed over several months.

The popularity of tattooing brought increased awareness of potentially hazardous conditions. When selecting a tattooist, consumers should ask whether the tattooist has taken an infection control course and ask to see the certificate of attendance. To date, more than 1,000 tattooists have taken the APT course and have received a certificate.<sup>13</sup> In states where tattooists are required to hold a state or local health license the customer should ask to see that as well. According to APT guidelines reported by Larkin,<sup>43</sup> the following infection control practices should be followed:

- The tattooist should have an autoclave (a heat machine regulated by the FDA) on the premises;
- Consent forms (which the consumer must complete) should be handled before tattooing;
- Immediately before tattooing, tattooists should wash and dry their hands thoroughly and don medical latex gloves, which should be worn at all times during the application of the tattoo;
- Needles and tubes should be autoclaved after each customer. Non-autoclavable surfaces such as bottles, drawer pulls, chairs, sinks, and the immediate floor area should be cleaned with a disinfectant such as a bleach solution; and
- Used absorbent tissue should be placed in a special puncture-resistant, leak-proof container for disposal.

However, these precautions are not always taken. Unfortunately, "scratchers," or persons who tattoo outside business premises on an informal basis also exist.<sup>44</sup> Scratchers who run peripheral operations working out of their home, the back of a van, in carnival-like settings, or out-of-doors, may not adhere to preferred sanitation practices.

### TATTOO REMOVAL

Tattoos are considered permanent, and because of this permanency tattoo artists advise the customer to be absolutely certain of the subject they wish to have tattooed (ie, name of wife, husband, lover, boyfriend, girlfriend, serpentine, heart, butterfly, ship, and so on) and that he or she wishes to keep the tattoo forever.<sup>45</sup> Varma and Lanigan<sup>6</sup> investigated the psychological, social, and financial impact of tattoos on those who requested laser tattoo removal. The main reasons for tattoo removal were enhancement of self-esteem, and social, domestic, and family reasons. Most persons seeking tattoo removal obtained a tattoo both impulsively and inexpensively, often as a youth, and almost three-fourths were tattooed below the legal age limit. The cost of tattoo removal ranges from \$250 to \$2,500 depending on the type and color of ink and on who performs the actual removal.<sup>37</sup>

Armstrong et al<sup>46</sup> surveyed 105 tattooed men and women between the ages of 17 and 62 regarding their tattooing decisions and experiences that might influence their motivation to have their tattoos later removed. Many survey respondents were internally motivated to have their tattoos

removed to disassociate from the past and improve their self-esteem. Similar to the Varma and Lanigan<sup>6</sup> study, many of the people in this survey impulsively obtained their tattoos.

Despite their intended permanence there are methods to remove tattoos. These methods include: surgical removal involving cutting the tattoo away; dermabrasion involving sanding the skin with a wire brush to remove the epidermis and dermis; salabrasion using a salt solution to soak the tattooed skin; and scarification, removing the tattoo with an acid solution creating a scar in its place.

Three varieties of FDA-regulated lasers also are used for tattoo removal: the Q-switched ruby laser, the neodymium YAG laser, and the Alexandrite laser. These lasers can remove most of the color with little scarring. Advantages of lasers are that the sessions are short, they necessitate a local anesthetic at most, and the damaged skin heals quickly. Potential scarring, skin discoloration, and the possibility of multiple sessions are disadvantages of laser-induced tattoo removal. With the advent of lasers, "the perception that tattoo removal is relatively simple has enhanced the image of tattoos as being non-permanent and will do little to reverse the upward trend of applications."<sup>6</sup>

## IMPLICATIONS FOR SCHOOL HEALTH PERSONNEL

### Health Educators

Tattooing is a youth health issue and a risk-taking behavior, regardless of where the tattoo is obtained. Health educators can assist adolescents in becoming informed decision-makers about tattooing (Figure 1). If adolescents who seek a tattoo are likely to obtain one, regardless of money, regulations, or risk, developing and implementing responsive educational programs is challenging, especially when many youth believe they have a "right to have a tattoo."<sup>40</sup>

To reduce the risks associated with tattooing, health education should begin in the elementary grades, especially for males, as a part of education about sources of disease and infection.<sup>8</sup> Informed decision-making can be promoted through health education by including information about blood borne diseases and their transmission. Information relevant to growth and development, as well as about permanently altering the body's appearance, may be appropriate.

Although schools offer one means of delivering tattoo information to adolescents, other potential information forums include youth organizations (YMCA/YWCA, religious organizations, Boy Scouts and Girl Scouts, sports groups, etc.) and the Internet. Health care practitioners offering routine school physicals and exams also can provide accurate and valuable information to adolescents about tattoos and their potential health risks.

Though health educators can provide worthwhile information regarding tattoos, they must be cognizant of any potential biases toward adolescents with tattoos. People who have acquired tattoos are often negatively stereotyped. A study by Stuppy, Armstrong, and Casals-Ariet<sup>47</sup> regarding health care provider attitudes toward tattooed people found that female respondents viewed tattooed people less favorably. The data also suggested that tattooed adolescents are perceived less positively than tattooed adults.<sup>47</sup> This predisposition in attitude may negatively affect how a health care

provider approaches an adolescent. Sensing this non-acceptance, an adolescent may be less open with the health care provider.<sup>47</sup>

Health educators can play a vital role in advocacy, especially for state licensure for tattoo artists, and in developing and implementing fines for those who perform these services without the appropriate license (Figure 2). By ensuring licensure, the health risks associated with tattooing can be decreased. Health educators, with support from professional organizations, also can lobby state and local legislators to provide the necessary resources to have routine public health inspections of tattoo establishments.

### School Nurses

Christensen et al<sup>37</sup> write that nurses in many health care settings encounter patients with one or more forms of body art or adornment. The extent to which nurses are able to heighten their awareness of tattoos will enable them to approach the patient care situation as openly, nonjudgmentally, and therapeutically as possible. Any tendency to be judgmental may be exacerbated for school nurses whose normal patient load consists primarily of youth who either have a tattoo, or are contemplating obtaining one. The presence of materials about tattooing and other forms of body adornment in waiting rooms and offices can alert students that the topic is "safe" to discuss with the practitioner.

School nurses can provide information about disease transmission and complications associated with body art.<sup>37</sup> They also can be sources of correct information if asked about the health and safety issues associated with tattooing, and encourage persons to learn as much as possible about the process in lieu of making an impulsive decision.

### Physicians

Sports physicals, routine preventive examinations, pediatric visits, and other periodic treatment for acute or chronic health problems afford physicians the opportunity to educate youth about tattoos and other forms of body art. The growing popularity of girls' and women's sports, as well as the documented popularity of tattooing among females<sup>10</sup> clearly indicate that the issue be addressed for males and females alike.

In addition, the presence of tattoos in youth can confound examination, diagnosis, and treatment of some ailments. Tattoos, especially ones using colored ink, may disguise or mask symptoms of inflammation, skin disorders, and even symptoms signifying a need for emergency care. Furthermore, Kreidstein, Giguere, and Freiberg<sup>48</sup> report that tattoos, especially ones containing iron-oxide-based pigments, can alter the quality of magnetic resonance imaging (MRI), a frequently employed tool in diagnosing sports-related injuries and other impact injuries common among adolescents. Kreidstein et al<sup>48</sup> also document the interaction of the MRI with molecules in the tattoo pigments that result in painful burning sensations in the patient that have the potential to interrupt or terminate the procedure.

As noted earlier, health care practitioners may have biases about persons with tattoos that can influence treatment.<sup>47</sup> Thus, physicians are an appropriate group of professionals for whom the topic of tattooing and other forms of body art can be addressed in professional and continuing education.

## CONCLUSION

Tattoos have a long history and a popularity that has ebbed and flowed. The popularity seen in the past decade, especially among youth and young adults, shows no sign of decline. Numerous health issues related to tattooing abound, especially among unlicensed amateurs and professionals who disregard sound sanitary measures. Efforts to eliminate tattooing or combat its current popularity are likely to be fruitless. Therefore, school health personnel can endeavor to make the practice safer, more regulated, and encourage children and youth to delay decisions to become tattooed and avoid clandestine self-administered or friend-administered operations. Since the motives for youth to become tattooed, whether by amateurs or professionals, remain only partially understood, focused research about these decisions may be enlightening for the development of responsive education programs. ■

## References

1. Sperry K. Tattoos and tattooing part I: history and methodology. *Am J Forensic Med Pathol.* 1991;12(4):313-319.
2. Fried RI. The psychodynamics of tattooing: a review. *Cleve Clin Q.* 1983;50(2):239-242.
3. Long GE, Rickman LS. Infectious complications of tattoos. *Clin Infect Dis.* 1994;18(4):610-619.
4. Levins H. The changing cultural status of tattoo art. *Tattooartist.* Available at: <http://www.tattooartist.com>. Accessed November 1998.
5. Greif J, Hewitt W. The living canvas. *Adv Nurs Pract.* 1998;6(6):26-31, 82.
6. Varma S, Lanigan S. Reasons for requesting laser removal of unwanted tattoos. *Br J Dermatol.* 1999;140(3):483-485.
7. Armstrong ML. Tattooed army soldiers: examining the incidence, behavior, and risk. *Mil Med.* 2000;165(2):135-141.
8. Armstrong M, McConnell C. Tattooing in adolescents: more common than you think - the phenomenon and risks. *J Sch Nurs.* 1994;10(1):26-33.
9. Houghton S, Durkin K, Parry E, Turbett Y, Odgers P. Amateur tattooing: practices and beliefs among high school adolescents. *J Adolesc Health.* 1996;17:420-425.
10. Armstrong ML. Career-oriented women with tattoos: Image. *J Sch Nurs.* 1991;23:215-220.
11. Haworth K. Body art challenges campus health centers. *Chron Higher Educ.* 1999;A43-A45.
12. US Food and Drug Administration. *Tattoos and Permanent Makeup Fact Sheet.* Center for Food Safety and Applied Nutrition, Office of Cosmetics Fact Sheet; February 3, 1995.
13. Alliance of Professional Tattooists (personal communication, October 5, 1999).
14. Braithwaite RL, Stephens T, Sterk C, Braithwaite K. Risks associated with tattooing and body piercing. *J Public Health Policy.* 1999;20(4):459-470.
15. Chang CJ, Ko YC, Liu HW. Seroepidemiology of hepatitis C virus infection among drug abusers in southern Taiwan. *J Formos Med Assoc.* 1998;97(12):826-829.
16. Marcoux D. Cosmetics, skin care, and appearance in teenagers. *Semin Cutan Med Surg.* 1999;18(3):244-249. 9.2:1-44.
17. Erwin J. Piercing the skin. *NurseWeek/HealthWeek.* Available at: <http://www.nurseweek.com/features/98-11/pierce.html>. Accessed November 1999.
18. American Public Health Association. *Control of Communicable Diseases Manual.* 17th ed. Washington, DC: American Public Health Association; 2000.
19. Alter MJ. Hepatitis C virus infection in the United States. *J Hepatol.* 1999;31Suppl 1:88-91.
20. Centers for Disease Control and Prevention. *Viral hepatitis C - fact sheet.* Available at: <http://www.cdc.gov/ncidod/diseases/hepatitis/cfact.htm>. Accessed March 2000.
21. Sun CA, Chen HC, Lu CF, et al. Transmission of hepatitis C virus in Taiwan: prevalence and risk factors based on a nationwide survey. *J Med Virol.* 1999;59(3):290-296.
22. Balaskekar R, Bulterys M, Jamal MM, et al. A case-control study of risk factors for sporadic hepatitis C virus infection in the southwestern United States. *Am J Gastroenterol.* 1999;94(5):1341-1346.
23. Brusafiero S, Barbone F, Andrian P, et al. A study on the role of the family and other risk factors in HCV transmission. *Eur J Epidemiol.* 1999;15(2):125-132.
24. Parana R, Vitvitski L, Andrade Z, et al. Acute sporadic non-A, non-B hepatitis in northeastern Brazil: etiology and natural history. *Hepatology.* 1999;30(1):289-293.
25. Wong PY, Dodd R, Kiely P, Carroll C, Whyte G. Characteristics of hepatitis C-positive blood donors in Victoria, Australia. *Transfus Med.* 1999;9(1):15-19.
26. Delage G, Infante Rivard C, Chiavetta JA, Willems B, Pi D, Fast M. Risk factors for acquisition of hepatitis C virus infection in blood donors: results of a case-control study. *Gastroenterology.* 1999;116(4):893-899.
27. Alter MJ, Gerety RJ, Smallwood L, et al. Sporadic non-A, non-B hepatitis: frequency and epidemiology in an urban United States population. *J Infect Dis.* 1982;145:886-893.
28. Alter MJ, Coleman PJ, Alexander WJ, et al. Importance of heterosexual activity in the transmission of hepatitis B in non-A, non-B hepatitis. *JAMA.* 1989;262:1201-1205.
29. The Epidemic. High Risk Groups. Available at: <http://www.epidemic.org/theFacts/theEpidemic/USRiskGroups.html>. Accessed November 1999.
30. Centers for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related diseases. *MMWR.* 1998;47:RR-19:1-40.
31. Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report. *MMWR.* 1997;9(2):1-44.
32. Sperry K. Tattoos and tattooing part II: Gross pathology, histopathology, medical complications, and applications. *Am J Forensic Med Pathol.* 1992;13(1):7-17.
33. Anderson RR. Tattooing should be regulated. *N Engl J Med.* 1992;326:207.
34. Chowfin A, Potti A, Paul A, Carson P. Spinal epidural abscess after tattooing. *Clin Infect Dis.* 1999;29(1):225-226.
35. Cetta F, Graham LC, Lichtenberg RC, Warnes CA. Piercing and tattooing in patients with congenital heart disease: patient and physician perspectives. *J Adolesc Health.* 1999;24(3):160-162.
36. Armstrong ML, Ekmark E, Brooks B. Body piercing: promoting informed decision making. *J Sch Nurs.* 1995;11(2):202-205.
37. Christensen MH, Miller KH, Patsdaughter CA, Dowd LJ. To the point: the contemporary body piercing and tattooing renaissance. *Nurs Spectrum.* 1999;9(4):12-14.
38. Tonkin RS. Adolescent risk-taking behavior. *J Adolesc Health Care.* 1987;8(2):213-220.
39. Armstrong M, Murphy KP. Tattooing: another adolescent risk behavior warranting health education. *Appl Nurs Res.* 1997;10(4):181-189.
40. Armstrong M. Adolescent tattoos: educating vs. pontification. *Pediatr Nurs.* 1995;21(6):561-564.
41. Houghton S, Durkin K, Carroll A. Children's and adolescents' awareness of the physical and mental health risks associated with tattooing: A focus group study. *Adolescence.* 1995;30(120):971-989.
42. Houghton S, Durkin K, Turbett Y. Public health aspects of tattooing among Australian adults. *Aust J Public Health.* 1995;19(4):425-427.
43. Larkin M. Tattooing in the 90's: ancient art requires care and caution. *FDA Consum.* 1993;27(8):29-33.
44. Wright J. Modifying the body: piercing and tattoos. *Nurs Standard.* 1995;10(1):27.
45. Goldstein N. Tattoo removal. *Dermatol Clin.* 1987;5(2):349-358.
46. Armstrong ML, Stuppy DJ, Gabriel DC, Anderson R. Motivation for tattoo removal. *Arch Dermatol.* 1996;132(4):412-416.
47. Stuppy DJ, Armstrong ML, Casals-Ariet C. Attitudes of health care providers and students towards tattooed people. *J Adv Nurs.* 1998;27(6):1165-1170.
48. Kreidstein ML, Giguere D, Freiberg A. MRI interaction with tattoo pigments: case report, pathophysiology and management. *Plast Reconstr Surg.* 1997;99:1717-1720.