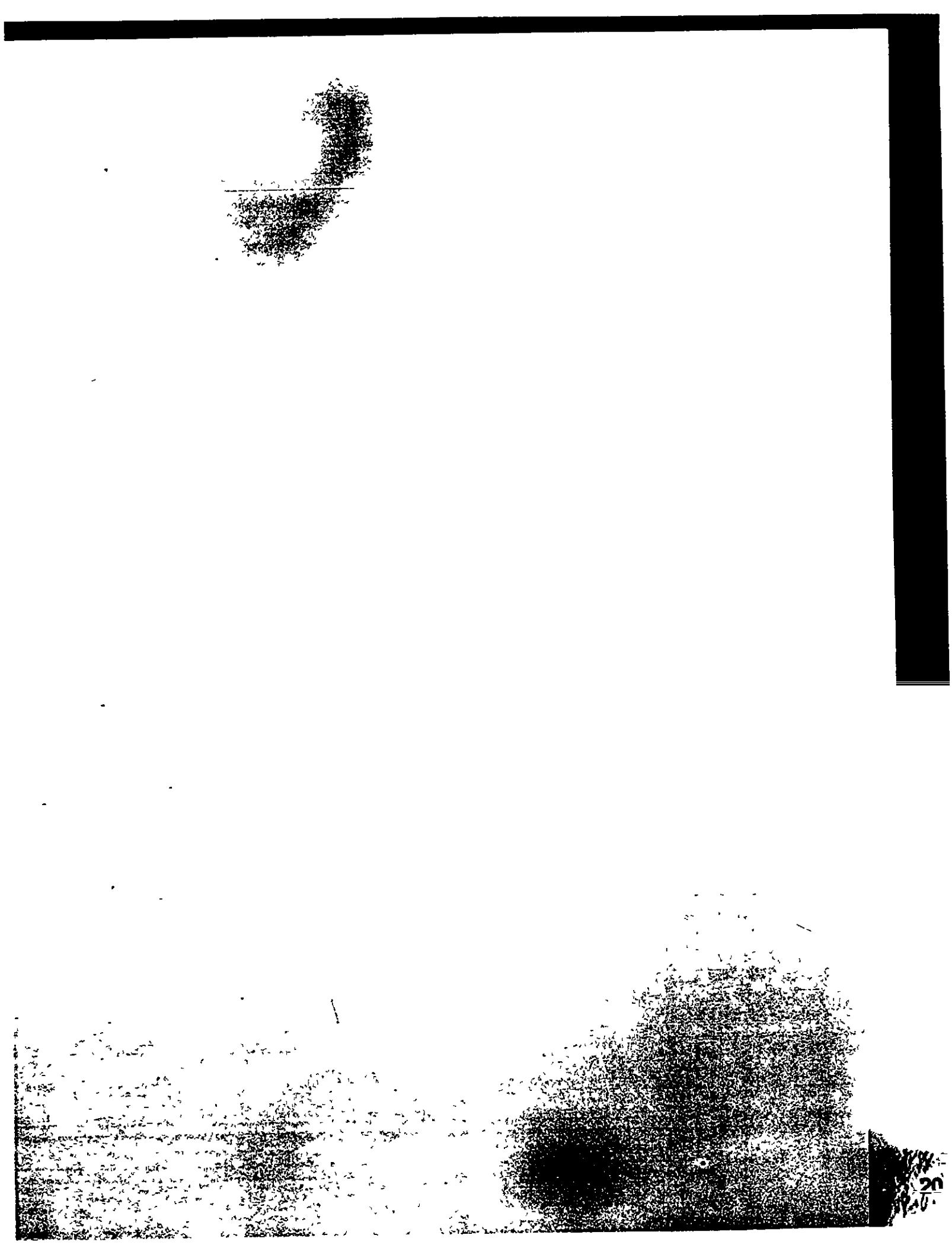
injuries.



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Epidemiology of Collegiate Baseball Injuries

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Abstract:

Objective: We sought to establish injury incidence, onset, location, type, and severity for a collegiate baseball team The second objective was to compare the number of musculoskeletal problems for which baseball players sought treatment with those that resulted in time lost or modified participation

Methods: This was a prospective epidemiologic study A complaint was defined as any evaluation by a player to the medical staff that required either evaluation or treatment An injury was defined as any complaint that resulted in altered participation or time lost from practice or game participation Participants were Division I collegiate baseball team with one athletic trainer and one academic sports medicine specialist All members of the collegiate baseball team were studied over a 3-year period to determine the overall incidence of injury per 1 000 exposures (A-E) to practice or participation injuries sustained over 3 years by collegiate baseball players

Results: Overall there were 277 complaints and 52 injuries (19%) The A-E rate was 5 83 Forty-six percent of the injuries occurred in practice and 54% in games Seventy-three percent of the injuries resulted in <7 days lost from sport and 25% resulted in >21 days lost participation The most common gin of injury was strains (23%) sprains (19%), and contusions (17%) Fifty-eight percent of the injuries were to the upper extremity, 15% to the trunk/back, and 27% to a lower extremity Upper extremity injuries accounted for 75% of the total time lost from the sport When divided by position the shoulder injuries occurred in pitchers (69%), infielders (19%) and outfielders (12%) Rotator cuff tendinitis was the most frequent complaint was the most frequent injury, and resulted in the most time lost from the sport

Conclusions: Defining injury as time lost or as altered participation underestimates the frequency with which players seek evaluation and treatment Injuries are divided widely across anatomic site, but upper extremity injures cause the most time lost from the sport Further study of the origin and prevention of upper extremity injuries in baseball is warranted

Key Words: Epidemiology—Collegiate baseball—Shoulder injuries

Clin J Sport Med 1998 8(1) 10–13

Baseball has been a popular sport since the nineteenth century. It continues to attract participants of all ages It has been estimated that >13,000 have played baseball at the major league level since 1900 (12) Baseball is also popular at the collegiate level, with 276 Division I teams, 194 Division II teams, and 283 Division III programs in the United States, involving an estimated total of 21,747 players annually (8).

Surprisingly, there are few studies of the incidence and distribution of baseball injuries at any level of play (11,13). The Major League Physicians and Trainers Associations acquires data on injuries at the major-league level, but this information has not been reported. At the major-league level, the severity of injuries is difficult to ascertain because players must be placed on the disabled list for a time set according to the type of injury, even though an athlete may recover before the end of that period.

The Consumer Product and Safety Commission monitors selected emergency rooms around the country and reports injuries that are treated at these centers (9) Although these data attempt to distinguish injuries sustained in organized league play from casual sandlot play, they presents neither incidence nor severity data in terms of disability or length of time the athlete is kept from participation. Most studies of baseball injuries focus on a single injury and its treatment, most often injuries to the shoulder and elbow (1–4,6,7,10,13–15)

Only two previous studies have evaluated epidemiology of injuries in baseball Splain and Rolnick (11) reported injuries in 88 players in a nonscholarship setting. Whiteside (14) reported on injuries to collegiate baseball players but included only "reportable" and "significant" injuries Walk et al (13) concluded that there is a paucity of prospective studies of interscholastic baseball injuries The aim of this study was to evaluate baseball injuries at the collegiate level and specifically to document injury onset, location, type, and severity for this population This study also sought to evaluate the number of complaints by baseball players for musculoskeletal problems that did not result in injury.

MATERIALS AND METHODS

All contacts by players in a Division I collegiate baseball program with the medical staff were recorded pro-

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spectively on a sports-injury registry (Med Sports System, Iowa City, IA, U S A), beginning with the autumn season in 1991 and ending after the spring season in 1993. Thus the data were collected for two autumn seasons and three spring seasons. The evaluations were performed by a single certified athletic trainer and a sports medicine fellowship-trained orthopaedic surgeon The number of players on the team and each individual's participation in practice or competition were closely monitored to obtain accident-exposure (A-E) rates. An exposure was defined as participation in either a practice or game session, regardless of length of time the athlete participated. A "complaint" was any problem for which a player sought an evaluation or treatment, which may or may not have resulted in time lost. For a complaint to be reportable, it had to occur during intercollegiate practice or competition. An "injury" was any complaint that resulted in altered participation or no participation in practice or a game (9). Only complaints and injuries that occurred during baseball-related activities were included in this study. Only orthopaedic injuries or injuries to the head, face, or neck were studied Injuries that caused a loss of <7 days of participation were considered minor, those that precipitated a loss of 7–20 days, moderate, and those ≥21 days, major (Med Sports Systems) Routine days of rest for pitchers after starting a game were not considered time off because of injury and were not included in the calculation.

RESULTS

At our institution over three seasons of play, there were 277 orthopaedic problems for which players sought treatment or ~92 per year Only 52 (19%) resulted in documented time lost from participation. There were 29 players on the team in 1991, 30 in 1992, and 34 in 1993. During this period, there were 12,828 exposures, and the incidence of injuries was 5.83 per 1,000 exposures.

During this study, 46% of the injuries occurred during practice, and 54% arose during game competition. The most common origins of injury were strains (23%), sprains (19%), and contusions (17%) Of the time-lost injuries, 73% of the injuries were minor, 2% were moderate, and 25% were major. Injuries tended to keep players from participating for either <1 week or >10 days; all of the injuries >10 days kept players out of competition for >21 days. There were no catastrophic injuries (deaths) during our study. A total of 320 practices and 363 games were missed because of these injuries.

Upper extremity complaints and injuries were more common than lower extremity injuries (Table 1). In this study, 58% of the injuries occurred to an upper extremity, 15% to the trunk/back, and 27% to a lower extremity. Upper extremity injuries accounted for 75% of total time lost from injury, the trunk/back for 17%, and the lower extremity for 8%. Eight injuries required surgery over the 3-year period of this study, and all of these were to the upper extremity.

The shoulder was the single most common body part for which players sought evaluations, and it was also the body part resulting in the most injuries The average shoulder injury resulted in 7 6 days lost from participation if surgical cases are omitted but 24 3 days if surgical cases are included Whereas more infielders sought evaluation of shoulder problems, shoulder injuries resulting in time lost or altered practices occurred in pitchers (69%), infielders (19%), and outfielders (13%, Tables 2 and 3)

The category of "arm injuries" included injuries to the upper arm, lower arm, elbow, and forearm The most common diagnoses for this area were forearm flexor strains, ulnar collateral ligament sprains and distal biceps tendinitis Wrist, hand, finger, and thumb injuries were most frequent in catchers Most of these were simple contusions that resulted in only a short time lost from participation, but there were five finger fractures, including two mallet fingers and one hook of the hamate fracture.

Lower leg, ankle, and foot injuries were also uncommon. The most common cause of lost time in this portion

TABLE 1. *Total complaints versus time lost for injuries by body part*

Location of injury	Total complaints % (n)	Time lost % (n)
Head	4 (11) (2%, 6%)*	0 (0)
Neck	3 (7) (1%, 4%)	0 (0)
Shoulder	24 (67) (19%, 29%)	32 (17) (20%, 45%)
Arm	6 (16) (3%, 9%)	2 (1) (0%, 6%)
Elbow	12 (33) (8%, 16%)	4 (2) (0%, 9%)
Wrist/hand/fingers/thumb	9 (24) (5%, 12%)	19 (10) (9%, 30%)
Trunk/back	10 (28) (7%, 14%)	15 (8) (6%, 25%)
Thigh	13 (37) (9%, 17%)	11 (6) (3%, 20%)
Knee	4 (12) (2%, 7%)	4 (2) (0%, 9%)
Lower leg	8 (23) (5%, 12%)	0 (0)
Ankle	4 (12) (2%, 7%)	8 (4) (0%, 15%)
Foot/toes	3 (7) (1%, 4%)	4 (2) (0%, 9%)

* 95% confidence intervals in percent beneath percentage and number

TABLE 2. *Number of shoulder complaints by diagnosis*

Complaint	Pitchers	Catchers	Infielders	Outfielders
Rotator cuff tendinitis	15	1	16	11
Contusion	1	1	3	1
Strain	4	2	6	0
Subluxation	1	0	3	0
AC sprain	0	0	0	1
AC arthritis	0	0	0	1

AC, acromioclavicular

TABLE 3. *Shoulder problems in all players*

Diagnosis	Total complaints % (n)	Time lost % (n)
Rotator cuff tendinitis	64 (43) (53%, 76%)*	69 (11) (46%, 91%)
Contusion	9 (6) (2%, 16%)	6 (1) (0%, 18%)
Strain	18 (12) (9%, 27%)	13 (2) (0%, 29%)
Subluxation	6 (4) (0%, 12%)	6 (1) (0%, 18%)
AC sprain	1 5 (1) (0% 4%)	6 (1) (0%, 18%)
AC arthritis	1 5 (1) (0% 4%)	0 (0)

* 95% confidence intervals in percent beneath percent and number
AC, acromioclavicular

of the extremity was foot contusion, which usually resulted from a ball hitting the foot. The knee was not commonly injured in any of the players. We found only one medial collateral ligament injury and one knee contusion in the course of 3 years.

The category of trunk and back injuries includes a wide variety of diagnoses to the upper back, spine, low back, ribs, sternum, and coccyx. The most common diagnoses were back muscle strain and spondylosis. During 3 years, we treated 12 players with complaints of low-back pain, but only six resulted in lost time. Injuries to the head and neck were uncommon. Although nine players at our institution were evaluated for concussions and contusions to the face, none resulted in time lost.

DISCUSSION

This study demonstrates that, at the intercollegiate level, injuries tend to be either minor or severe, that strains and sprains are the most common injury mechanism, and that the upper extremity is most commonly injured and results in the most time lost from participation. Direct comparison of these results with those of other studies in the literature is difficult because most studies are not prospective, do not include a consistent definition of an injury, and involve multiple institutions with multiple trainers and physicians. Most other studies only reported injuries that significantly underestimated the prevalence of more minor complaints by players and the resulting frequency of treatment by the medical staff.

Chronic-overuse injuries and traumatic injuries causing fractures are the most common major injuries in baseball players. Surprisingly, in our cohort, infielders with shoulder problems required as many surgical procedures as the pitchers. We conjecture that the infielders had shoulder problems for several reasons. First, infielders must throw at a variety of angles, sometimes off-balance. It may be that the resultant kinematics increase the stresses typically exerted on the shoulder and elbow. Second, many of the college infielders at our institution were pitchers before coming to college. This might have predisposed them to shoulder problems at this level of competition, but this issue was not amenable to statistical analysis.

Baseball is generally considered a finesse sport with little physical contact between players. At our institution, contact with the ball, the bat, or an opposing player resulted in 120 lost days and 63 games missed. Catchers and infielders were particularly vulnerable. Although sliding injuries have received attention in the literature, there were no injuries from sliding in the 3 years of this study (10). Data from both this study and the NCAA suggest that problems resulting from head and facial injuries do not approach the magnitude seen at other levels of participation. Head and facial injuries were not common in this study. A review by the NCAA reported that baseball has the lowest injury rate for concussions and head and neck injuries among all collegiate sports they surveyed (5).

CONCLUSIONS

This study supports the commonly held beliefs that injuries to the shoulder and upper extremity result in the greatest morbidity among baseball players. This study is in agreement with previous authors who suggested that further study of the origin and prevention of shoulder problems in both pitchers and infielders is warranted (11,13). Further study will be needed to evaluate the effect of both preventive and therapeutic measures for baseball injuries.

Acknowledgment: We thank Chin-Tsang Chiang for statistical analysis of the data.

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Baby Boomer Sports Injuries

April 2000

U.S. Consumer Product Safety Commission
Toll-free Hotline: 1-800-638-2772
www.cpsc.gov

Baby Boomer Sports Injuries

Sports-related injuries among those ages 35 to 54 -- today's baby boomers -- increased about 33% from 1991 to 1998. There were just under 276,000 hospital emergency room-treated injuries to persons 35 to 54 in 1991 compared to slightly more than 365,000 sports injuries to persons of these ages in 1998. This increase in injuries, which occurred in 16 popular sports activities, was due primarily to baby boomers' increased numbers participating in these sports.

When all medically-attended injuries in these popular sports were included, CPSC estimated there were a total of more than 1 million injuries to baby boomers in 1998 (compared to 778,000 such injuries to persons 35 to 54 in 1991). These sports injuries to baby boomers cost the nation over $18.7 billion in 1998.

Bicycling and basketball were associated with the largest number of 1998 baby boomer sports injuries treated in hospital emergency rooms. Of special note (see below), baby boomers suffered a relatively high number of head injury-related deaths while bicycling.

Baby boomers represented almost one-third of all Americans who participated in sports in 1998. These 79.1 million people comprised over 29 percent of the total U.S. population. In 1998, there were 14 million more Americans in the 35 to 54 age group than in 1991.

Sports Injuries and Deaths

Seven sports showed significant increasing trends in the number of emergency room-treated injuries in the 35 to 54 age group in 1998. These were: bicycling, golf, soccer, basketball, exercise and running, weightlifting and in-line skating. Participation data showed increases in baby boomers' sports participation for most of these sports. (Participation data was not available for weightlifting, and exercise and running.)

Three sports showed significant decreasing trends in the number of emergency room-treated injuries and decreasing trends in the number of participants. These were: skiing, tennis and volleyball.

Figure 1 (attached) compares injuries for 1991 and 1998 for 16 popular sports.

For three sports, there were large numbers of deaths reported to CPSC. These were: bicycling (290 deaths a year, all but 35 motor vehicle-related); swimming (67 deaths a year associated with swimming pools); and skiing (7 deaths a year).

Safety Equipment-Related Issues

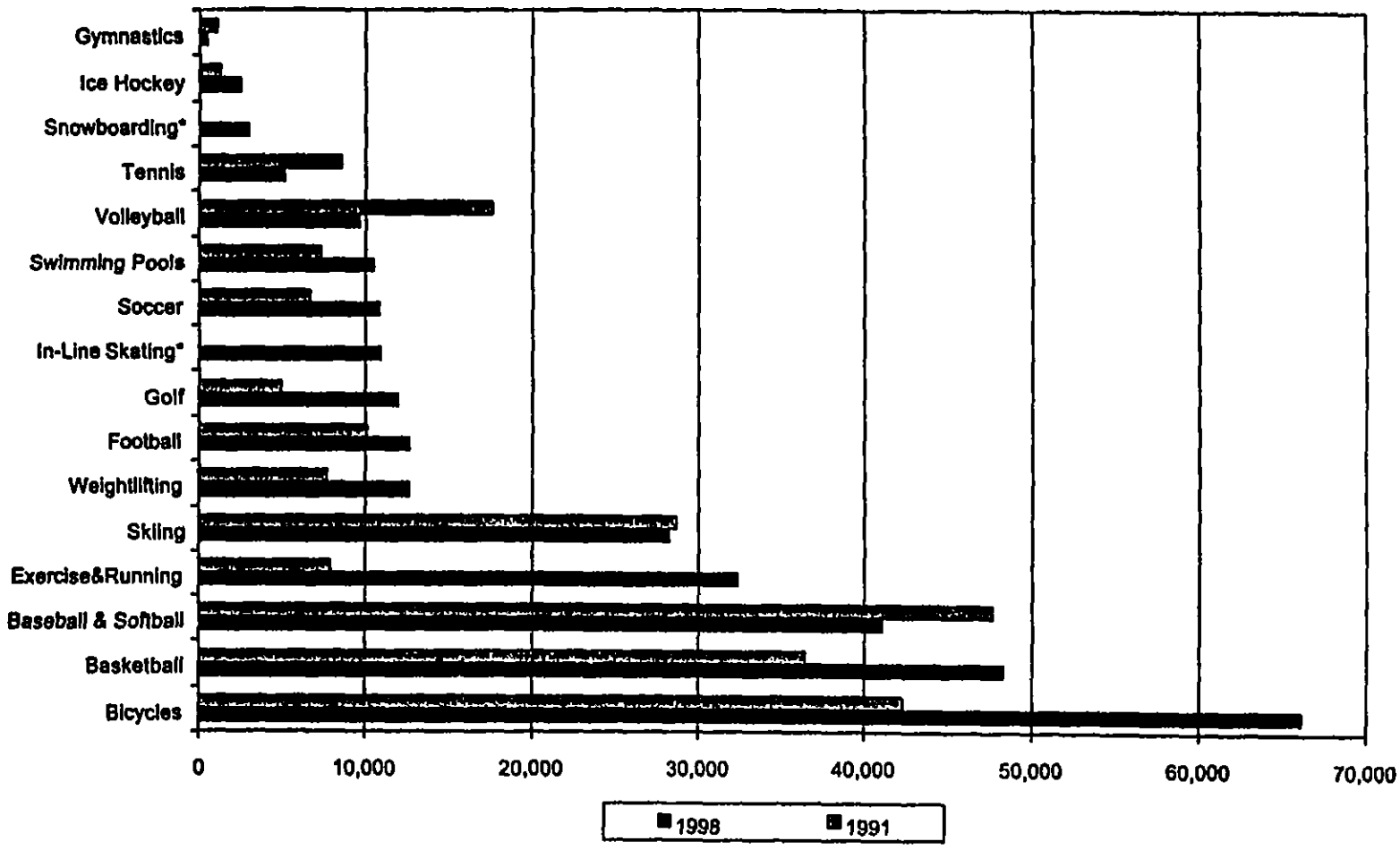
Baby boomers who rode bicycles died from head injuries at nearly twice the rate as children who rode bikes. This difference is likely the result of greater helmet usage among children. According to CPSC, 69% of children wear helmets when bicycling compared to only 43% of baby boomers.

Baby boomer in-line skaters, however, were injured less frequently than other skaters. In 1998, about 3.2 out of every 1,000 baby boomer in-line skaters were treated in an emergency room for a skating injury. Among children under 18, this number was 4.6 out of every 1,000. For the population as a whole, it was 4.1 per 1,000 skaters. Baby boomers suffered a much smaller proportion of arm and hand injuries than other age groups, which may be an indication they are wearing appropriate protective equipment such as gloves, wrist guards and elbow pads.

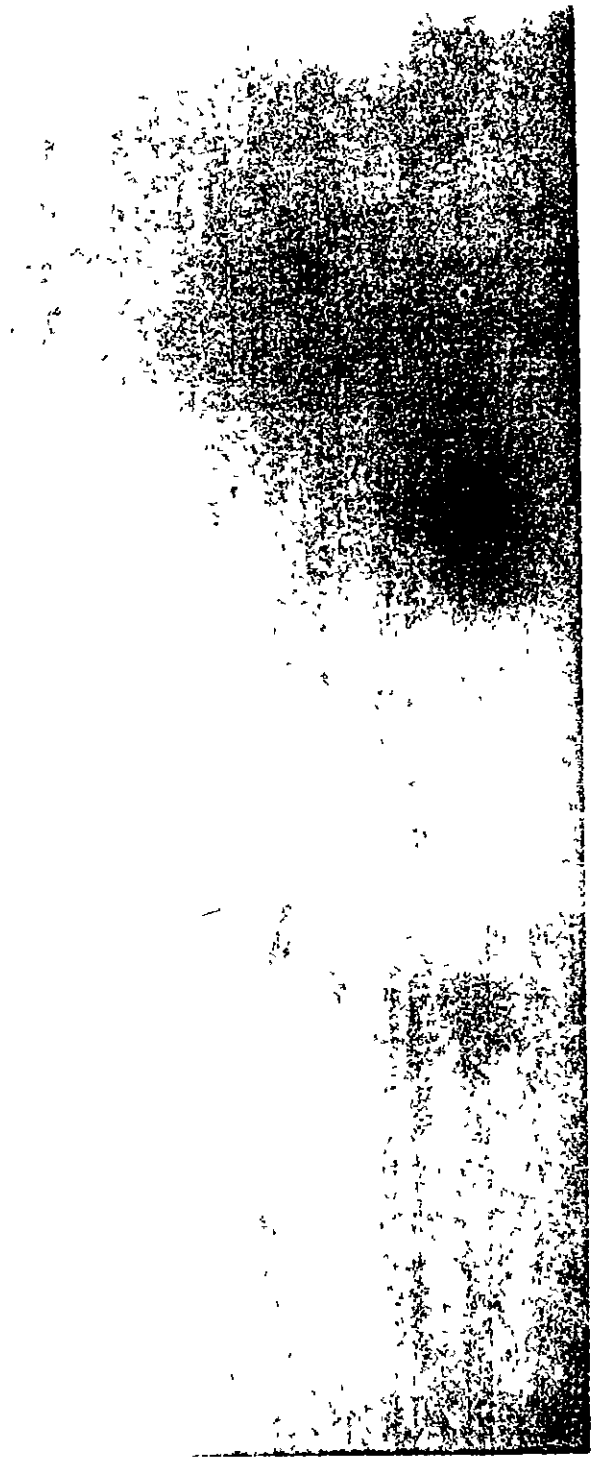
Conclusion

It is important for baby boomers to stay active and to participate in sports. But safety is an essential consideration. For example, baby boomers can reduce serious head injuries by wearing bike helmets when bike riding. Other sports-related injuries can be avoided or reduced by following such precautions as wearing other appropriate sports safety equipment, warming up before vigorous exercise, and increasing one's amount of exercise gradually.

Figure 1. Estimated Number of Emergency Room Treated Injuries Among Persons 35 - 54 Years of Age Associated with 16 Popular Sports Categories, 1991 and 1998



SOURCE: U.S. Consumer Product Safety Commission, *Directorate for Epidemiology*, National Electronic Injury Surveillance System (NEISS)
* NOTE: In-line skating and snowboarding were new sports in the 1990s. Injury data were first collected for in-line skating in 1993 (4,310 estimated injuries) and snowboarding in 1994 (1,520 estimated injuries).



NEWS from CPSC

U.S. Consumer Product Safety Commission

Office of Information and Public Affairs Washington, DC 20207

FOR IMMEDIATE RELEASE
June 4, 1996
Release # 96-140

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(301) 504-0580 Ext. 1193

CPSC Releases Study of Protective Equipment for Baseball

"We want kids outside in the sunshine, not inside in an emergency room," said CPSC Chairman Ann Brown.

WASHINGTON, D.C. The U.S. Consumer Product Safety Commission (CPSC) announced today that safety equipment for baseball could significantly reduce the amount and severity of 58,000 (or almost 36 percent of) baseball-related injuries to children each year.

Baseball, softball, and teeball are among the most popular sports in the United States, with an estimated 6 million children ages 5 to 14 participating in organized leagues and 13 million children participating in non-league play. In 1995, hospital emergency rooms treated 162,100 children for baseball-related injuries.

At a press conference at Camden Yards stadium, home of the Baltimore Orioles, CPSC released the findings from its one-year study on the ability of protective equipment, including softer-than-standard baseballs, safety release bases, and batting helmets with face guards, to reduce injuries to children playing baseball.

"CPSC is the federal agency responsible for overseeing the safety of 15,000 different types of consumer products, including sports equipment and products claiming to reduce injuries and increase safety," said CPSC Chairman Ann Brown. "Parents need to know what options they have in protective equipment so they can make the best decisions for their children playing baseball."

Nick Senter, executive director of the Dixie Baseball League, an organization based in 11 Southern states, and Richard Bancells, trainer of the Baltimore Oriole's baseball team, joined Chairman Brown for today's announcement.

Senter said, "Since we began using batting helmets with face guards in the Dixie League, we've seen a drop in both injury rates and insurance rates."

CPSC collected and analyzed data on baseball, softball, and teeball-related deaths and injuries to children to determine specifically how these children were injured and what safety equipment could prevent such injuries. CPSC also studied voluntary safety standards and reviewed published scientific literature evaluating currently available protective equipment.

CPSC analyzed the 88 reports it received of baseball-related deaths of children between 1973 and 1995. It found that 68 of the deaths were caused by ball impact and 13 were caused by bat impact. Of the 68 ball impact deaths, 38 resulted from blows to the chest while 21 deaths were caused by a ball hitting a player's head.

Of the 162,100 hospital emergency-room-treated injuries in 1995, most of the injuries (almost 75

percent) occurred to older children ages 10 to 14. This age group represents about half of the total number of children playing baseball.

Of the total number of injuries to children, CPSC considers about 33 percent severe, including fractures, concussions, internal injuries, and dental injuries. The remaining 67 percent less severe injuries include contusions, abrasions, lacerations, strains, and sprains. More than 50 percent of the children under age 11 who were injured while playing baseball sustained injuries to the head and neck area, while a larger percentage of older children sustained injuries to their arms and legs.

Based on its analyses, CPSC found that three pieces of safety equipment will help reduce injuries.

Softer-than-standard baseballs and softballs, which have a softer, spongier core than standard baseballs and softballs, can reduce ball impact injuries. Face guards that attach to batting helmets and protect the face can reduce injuries to batters.

Safety bases that release from their anchor can reduce sliding injuries. Safety release bases that are based on age, gender, and skill levels of the players provide the best protection.

Conclusions from the CPSC Study:

- Baseball protective equipment currently on the market may prevent, reduce, or lessen the severity of more than 58,000 injuries or almost 36 percent an estimated 162,100 hospital emergency-room-treated, baseball-related injuries occurring to children each year.
- Softer-than-standard balls may prevent, reduce, or lessen the severity of the 47,900 ball impact injuries to the head and neck.
- Batting helmets with face guards may prevent, reduce, or lessen the severity of about 3,900 facial injuries occurring to batters in organized play.
- Safety release bases that leave no holes in the ground or parts of the base sticking up from the ground when the base is released may prevent, reduce, or lessen the severity of the 6,600 base-contact sliding injuries occurring in organized play.

Baseball Safety

Publication # 329

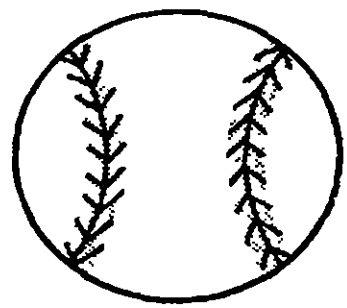
Fact Sheet

The U.S. Consumer Product Safety Commission (CPSC) wants you and your family to be safe when playing baseball. CPSC announced that softer-than standard baseballs, safety releases bases, and batting helmets with face guards could significantly reduce the amount and severity of 58,000 (or almost 36 percent of) baseball-related injuries to children each year.

Baseball, softball, and teeball are among the most popular sports in the United States, with an estimated 6 million children ages 5 to 14 participating in organized leagues and 13 million children participating in non-league play. In 1995, hospital emergency rooms treated an estimated 162,100 children for baseball-related injuries.

CPSC collected and analyzed data on baseball, softball, and teeball-related injuries to children to determine specifically how these children were injured and what safety equipment could prevent such injuries. CPSC found that baseball protective equipment currently on the market may prevent, reduce, or lessen the severity of more than 58,000 injuries occurring to children each year.

Softer-than-standard balls may prevent, reduce, or lessen the severity of the 47,900 ball impact injuries to the head and neck.



Soft Core Ball

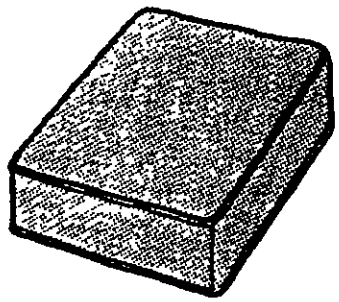
Batting helmets with face guards may prevent, reduce, or lessen the severity of about 3,900 facial injuries occurring to batters in organized play.

Helmet with Face Guard

U.S. Consumer Product Safety Commission

Washington, DC 20207

Hotline: 1-800-638-2772



Safety release bases that leave no holes in the ground or parts of the base sticking up from the ground when the base is released may prevent, reduce, or lessen the severity of the 6,600 base-contact sliding injuries occurring in organized play.

Release Base

The U.S.Consumer Product Safety Commission protects the public from unreasonable risks of injury or death from 15,000 types of consumer products under the agency's jurisdiction To report a dangerous product or a product-related injury and for information on CPSC's fax-on-demand service, call CPSC's hotline at (800) 638-2772 or CPSC's teletypewriter at (800) 638-9270. To order a press release through fax-on-demand, call (301) 504-0051 from the handset of you fax machine and enter the release number Consumers can obtain this release and recall information at CPSC's web site at http://www.cpsc gov or via Internet gopher services at cpsc gov Consumers can report product hazards to info@cpsc.gov.

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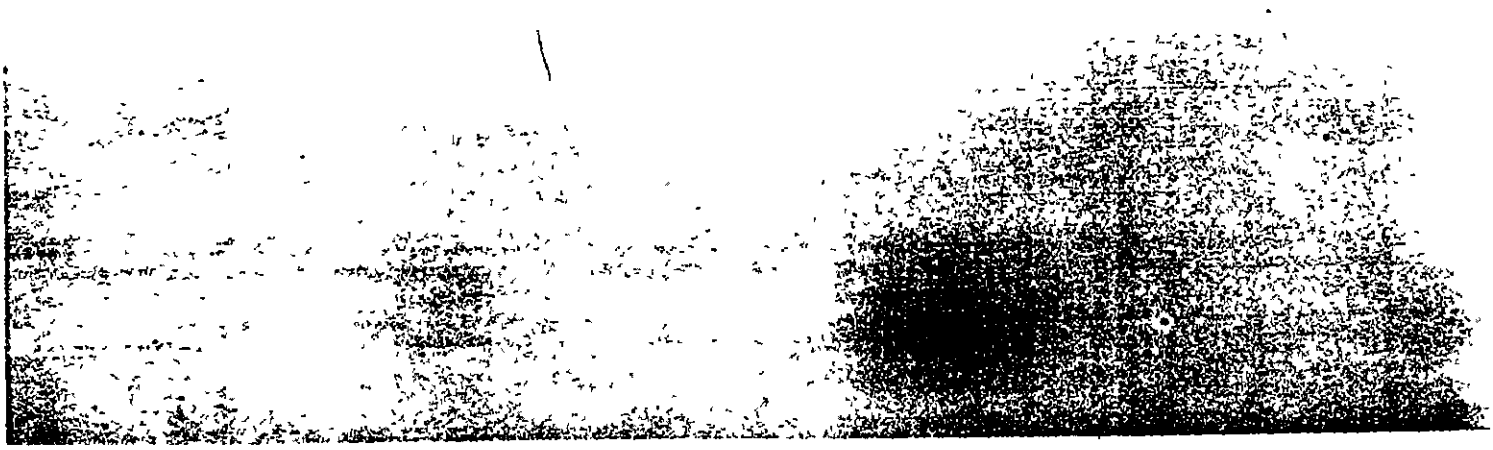

the physician and sportsmedicine

News Briefs

THE PHYSICIAN AND SPORTSMEDICINE - VOL 27 - NO. 9 - SEPTEMBER 99

Getting to the Heart of the Softer-Baseball Debate

Softer baseballs are used in an effort to reduce the severity of impact injuries to the brain, face, and heart, but debate on their efficacy, along with hesitance within baseball, has hindered their widespread adoption.

Recent reports on baseball impact injuries bring the issues into sharper clinical focus, including new information about the etiology of commotio cordis and conflicting reports about whether softer baseballs reduce the risk of that event. Another study addresses the risk of eye injuries with softer baseballs (see "Researchers Weigh In on Eye Issues, below).

Lance Van Auken, director of publications and media relations for Little League Baseball, says several models of softer baseballs are approved for play in various Little League divisions. Each local league's board of directors determines which balls the league will use. "We do know that a majority of the very youngest divisions [5- to 8-year-olds] use some type of softer baseballs. However, in the divisions that include players ages 9 to 18, the softer baseballs are rarely used," he says.

New Information on Commotio Cordis

Commotio cordis, sudden death from relatively minor chest wall impact in the absence of structural cardiac injury or abnormality, is rare in sports. Each year two to four commotio cordis deaths are reported in baseball (1). Maron et al (2) recently published information on 70 cases contained in the US Commotio Cordis Registry. The victims were most likely to be boys younger than 16, and the most common sports involved were baseball, softball, and hockey.

In 1998, Link et al (3) narrowed the proposed mechanism of commotio cordis by showing that impacts that occurred 30 to 15 msec before the peak of the T wave produced ventricular fibrillation in young pigs.

In a separate report, Link et al (4) described the high frequency of heart block and ST-segment elevation after resuscitation, which may explain why resuscitation is often difficult in patients with commotio cordis.

Do Softer Baseballs Reduce the Risk of Commotio Cordis?

In 1992, Janda and colleagues (5,6), using a computerized model, anesthetized pigs, and crash test dummies, suggested that softer baseballs did not decrease and perhaps increased the risk of commotio cordis. In their most recent study (7), Janda's group assessed 9 soft-core baseballs as they struck a three-rib biomechanical surrogate at three speeds (40, 50, and 60 mph). A standard Major League baseball served as a control. Janda says the study determined the "viscous criterion" (VC) for each baseball. VC was developed by the automotive industry during crash testing to measure how far and how fast the chest caves in during impact, says Janda, an orthopedic surgeon in Ann Arbor, Michigan, and director of the Institute for Preventative Sports Medicine (ISPM). Baseballs with higher VC values could carry a greater injury risk.

The study found that one of the softer baseballs had a significantly lower VC value than the standard baseball at all three speeds, six had a lower VC at 60 mph, four had a lower VC at 50 mph, and one had a lower VC at 40 mph. One of the softer baseballs had a higher VC at 60 mph. The researchers say the study shows that not all softer baseballs significantly reduce the risk of chest impact injuries. "We also determined that the weight of the ball was critically important," Janda says. The two lightest baseballs were among the group that had a significantly lower VC. (The standard baseball was the fourth lightest baseball.)

In a 1996 review of protective equipment in youth baseball (8), the US Consumer Product Safety Commission (CPSC) analyzed the impact of softer baseballs. The type of baseball involved was recorded in 94% of 88,700 baseball impact injuries recorded in 1995. The CPSC reported that the softer baseballs were involved in fewer and less severe injuries than were the standard baseballs In its discussion of the apparently contradictory studies (5,6) from Janda's group, the CPSC notes that it commissioned an independent review of the articles by six scientific and medical experts. The reviewers questioned the ability of the biological and biomechanical models to mimic chest impact injuries in children. The CPSC concluded that softer baseballs can reduce the number and severity of youth baseball injuries.

Meanwhile, Link et al (3) also evaluated the effect of softer baseballs as a component of their pig study. They tested three softer balls and a standard Little League baseball on 48 pigs, timing impacts to occur with the up slope of the T wave. Each ball weighed the same and was propelled at 30 mph.

Researchers noted a relationship between baseball hardness and the likelihood of ventricular fibrillation. The lowest risk was for the softest baseball; although a reduced risk of death was seen with medium-soft and least-soft baseballs, the difference did not reach statistical significance. The authors concluded that though the softest baseball may not be practical for competitive play by older youths because of ball performance, it may be useful for T-ball or recreational play.

Link and Janda are critical of each other's studies. Link says that Janda's most recent study (7) deemphasizes the finding that the balls used in T-ball were safer. He also notes that the 1998 Janda study (7) evaluates both weight and softness, which obscures the qualities that make a ball safer. "The data with safety baseballs in both our and Janda's experiments show there is little doubt that safety baseballs will reduce the risk of both cardiac and other injuries in youth baseball," says Link, who is assistant professor of medicine and director of the Cardiovascular Center for the Evaluation of Athletes at New England Medical Center in Boston.

Janda says the 30-mph speed used by the Link group is slower than actual Little League play, particularly when kids are using aluminum or titanium bats. Link counters that his group's latest study (9) yielded the same results using a 40-mph velocity. Janda also notes that his group looked at nine baseball models, whereas Link's group evaluated three.

Link says he is concerned that the public's perception of Janda's studies could lead to underutilization of the softer baseballs, which he believes could increase the risk of sudden death and other injuries.

J.J. Crisco, PhD, research director of the National Operating Committee on Standards for Athletic Equipment (NOCSAE), says part of the problem with interpreting the data about softer baseballs and developing standards for protective equipment is that the dynamics of chest impact injuries are more complicated than for head injuries or muscle contusions. "We know why softer baseballs decrease those injuries: accelerators and stress. But we don't yet have a mechanical variable to decrease for commotio cordis," he says.

There is no widely accepted standard for baseball hardness, though Crisco notes that the American Society for Testing and Materials is working on proposed standards. He adds that the baseballs used in Little League--made from cheaper materials--have been found to be harder than those used in Major League Baseball. NOCSAE has published a voluntary standard for baseballs that are designed to reduce head injuries. Crisco says the group is presently updating the standard to address a greater spectrum of injuries, including commotio cordis.

What's the Prevention Message?

Though Janda and Link disagree on the safety of softer baseballs, they do agree that the devices are not magic bullets for preventing commotio cordis and that good coaching can help young players avoid baseball impact injuries.

"We believe kids should be taught how to get out of the way," Janda says. "I've heard eyewitness reports of kids panicking and walking right into the ball, but if you watch Cal Ripken, he tucks his head and rolls his shoulder so that his scapula takes the blow." He says that kids also need to learn how to avoid chest impact injuries by sliding into base with their back toward the catcher. Janda says some recreational leagues seek to avoid baseball impact injuries among younger players by having the coach of the batting team do the pitching; a few use mechanical pitching machines.

The research jury is still out on how well chest protectors prevent chest impact injuries. Eleven (16%) of the players in the US Commotio Cordis Registry were wearing commercially available protective gear when the incidents occurred. Janda says the ISPM is conducting a study on chest protectors.

Van Auken says that Little League Baseball is in the third year of a 3-year study to determine the protective value of equipment (ie, softer baseballs, batting vests, face masks, breakaway bases) used by various divisions.

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Researchers Weigh In on Eye Issues

Baseball is the leading cause of sports-related eye injuries in children aged 5 to 14 (1,2). One of the concerns among physicians and coaches has been that a softer baseball could increase the risk of eye injury because the softer material might protrude farther into the eye orbit.

To investigate those suspicions, a recent investigation by Vinger et al (1) had two objectives: (1) to measure the intrusion of baseballs of 6 different hardnesses launched at several speeds into an artificial eye orbit, and (2) to determine if baseball players could tell the difference between harder and softer balls when catching, throwing, and batting.

Researchers found that the softest of the six baseballs intruded significantly into the orbit, and recommended that this ball be used only among players younger than age 6 who have little grip strength. They found that orbital intrusions of the next two softest balls were not clinically meaningful and, because they had a lesser peak force and onset rate than Major League baseballs, should not cause an increase in eye injuries.

When the researchers evaluated whether softer baseballs changed the feel of the game for participants, they found that children younger than age 14 could detect a difference only when using the softest baseball and that adults could not differentiate between the hardest "soft" baseball and standard baseballs.

While advocating the use of softer baseballs in youth baseball to prevent brain injury and *commotio cordis*, the researchers note the best way to decrease eye injuries in baseball is to use protective eyewear that conforms to American Society of Testing and Materials (ASTM) standards for batters, base runners, and fielders.

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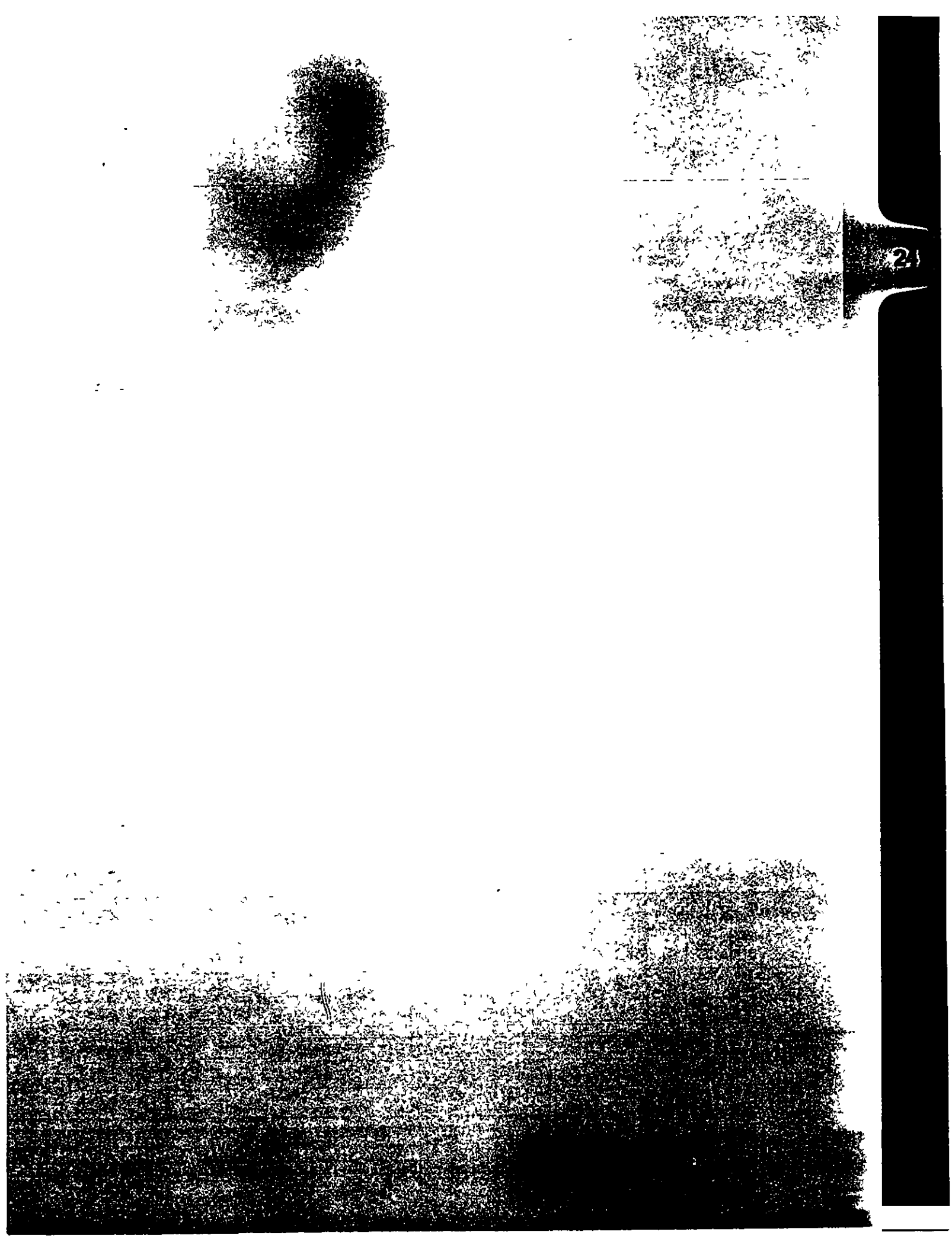


Babe Ruth League, Inc.

1770 Brunswick Pike • P.O. Box 5000 • Trenton, NJ 08638 • Phone: 609-695-1434 • Fax: 609-695-2505

RONALD TELLEFSEN
President/Chief Executive Officer

January 20, 1999

Mr. Rex Bradley, Vice President
Professional & Amateur Services
HILLERICH & BRADSBY COMPANY, INC.
P. O. Box 35700
Louisville, Kentucky 40232

Dear Rex:

As a follow up to our conversation on metal bats during the American Baseball Coaches Convention in Atlanta, Babe Ruth League, Inc. has not found the metal bat to be an unreasonable risk to our players. Our team accident insurance loss ratio did not warrant any increase in premium to our leagues for the 1999 season. Furthermore, we did not experience any premium increase in 1998.

Babe Ruth League, Inc. will continue to study the bat as well as the baseball with our insurer in order to obtain the frequency and patterns of significant injury.

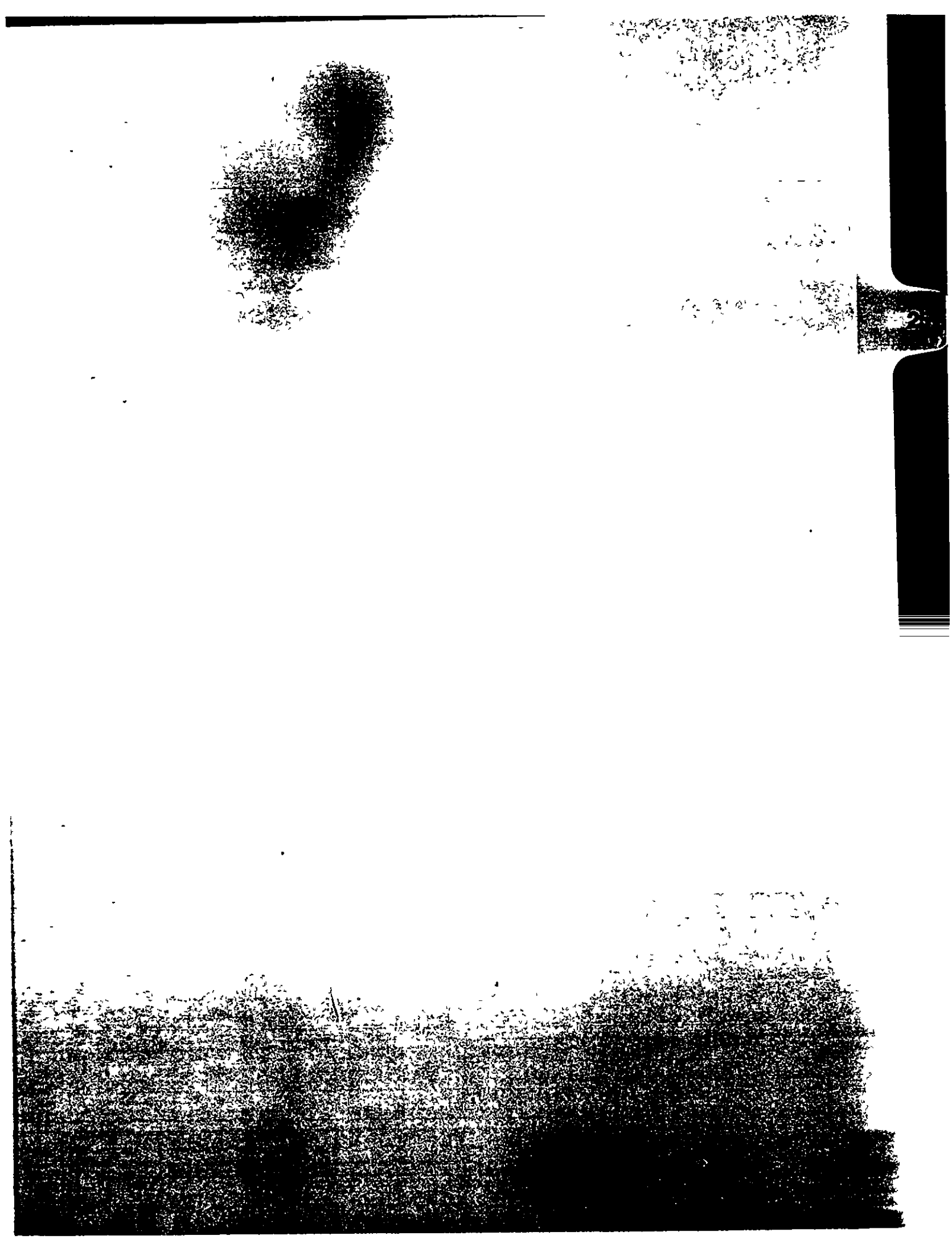
It will always be the policy of Babe Ruth League, Inc. to demonstrate care for the players as we are always willing to look at issues on safety and rely on the judgment of the experts.

In closing, Babe Ruth League, Inc. will not be making any current changes relative to the usage of the metal bat. As always, we look forward to continuing our excellent working relationship with Hillerich & Bradsby.

Sincerely,

Ronald Tellefsen

RT/to



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The Baton Rouge Sunday Advocate

Sunday, June 18, 2000

Sports

Tigers take celebration to Assembly Center today

SCOTT RABALAIS

Notebook

OMAHA, Neb. - The celebration moves back to Baton Rouge today, as the LSU Tigers return home with their fifth college baseball championship.

The team will arrive at noon at the Pete Maravich Assembly Center. There is no admission charge.

Also being honored will be the LSU women's track and field team. The Lady Tigers won the NCAA outdoor championship June 3, their 12th outdoor title and 20th overall. A women's outdoor track championship has preceded an LSU baseball title each year, including wins on the same day in 1997.

The track and baseball titles are the 33rd and 34th in LSU history, the most of any Southeastern Conference school.

LSU championship baseball T-shirts will go on sale today at 8:30 a.m. at the LSU gift shop in Tiger Stadium.

ALL-CWS TEAM: Five LSU players made the **College World Series** All-Tournament team, led by senior pitcher Trey Hodges, the CWS Most Outstanding Player.

Hodges (5-2) got wins against Southern Cal on Monday and against Stanford, and also pitched Thursday against Florida State. He finished the CWS with a 1.69 earned run average, giving up just two runs in 102/3 innings pitched.

Hodges is the fourth MVP from LSU, following Gary Hymel in 1991, Todd Walker in 1993 and Brandon Larson in 1997.

Also on the All-CWS team (as voted by the media) from LSU were second baseman Mike Fontenot, third baseman Blair Barbier, shortstop Ryan Theriot and Brad Hawpe as the designated hitter.

University of Louisiana at Lafayette outfielder Steven Feehan was also an All-CWS selection.

TURTLE'S TIME: This time, Turtle Thomas will wear his championship ring.

LSU's hitting coach and recruiting coordinator was here with Miami a year ago as the Hurricanes won the national championship 6-5 over Florida State.

Thomas was on his way out after a bitter rift with Miami head coach Jim Morris. He received but never wore his national championship ring, giving it to one of his sons as a souvenir.

Thomas then went to LSU, where the Tigers brought him right back to Omaha with another 6-5 title game victory.

"This is so much better," Thomas said. "I was proud and happy for those Miami guys who won it, because the players were great. But I tell you, it just doesn't seem like any comparison at this moment."Thomas, who was a Miami assistant when LSU's Warren Morris beat the Hurricanes 9-8 with a two-run home run in the bottom of the ninth, said he thought of that historic moment when the Tigers were batting with the game tied 5-5 in the bottom of the ninth.

"Yeah, as a matter of fact I did," Thomas said. "I thought maybe (second baseman) Mike Fontenot might hit it out."Instead, catcher Brad Cresse drove in Ryan Theriot from second with only his second hit of the CWS.

"I'm so happy for Brad," Thomas said. "He struggled so much and he had such a great year. He deserved to get a hit."

DRESSED FOR SUCCESS: Five championship game appearances have seen the LSU Tigers in five different uniform styles.

LSU wore gray in 1991, white with purple pinstripes in '93, gold in '96 and purple in '97. This year's uniform is white with stripes down the pants legs.

BEHIND THE PLATE: Scott Graham, Saturday's home plate umpire, also served in the same capacity for the 1996 championship game between LSU and Miami. First base ump Al Davis was behind the plate for the 1997 final between LSU and Alabama.

HAWPE DOUBLE RECORD: LSU's Brad Hawpe never got another double after the one he hit in the CWS opener against Texas.

Hawpe finished with 36 doubles this season, tying the record

previously set by Jeremy Morris of Florida State in 1996 and Damon Thames of Rice in 1998. Hawpe did hit three homers in the series, giving him 12 for the season.

ATTENDANCE RECORD: The **College World Series** drew 200,917 fans this season, a record average of 22,324 per session. It is the fourth straight year that the CWS has set a record for session average **attendance.**

Saturday's championship game **attendance** of 24,282 was not a record.

LSU HITTING RECORD: The Tigers' final team batting average finished at a school record .340. LSU's previous best was .325 in 1990.

MIGHT HAVE BEEN: Nebraska coach Dave Van Horn made the **College World Series,** although it was without his Huskers team.

Van Horn sat behind the Stanford dugout during Saturday's championship.

Stanford is the reason Van Horn was in the stands and not in the dugout. The Cardinal clinched their 12th CWS berth by beating Nebraska in the super regionals two weeks ago.

The Cornhuskers opened the best-of-three series with a win, but the Cardinal won the next two games to keep Nebraska from making its first CWS.

MUTH STIFLED: LSU right fielder Ray Wright kept Stanford's Edmund Muth from breaking his own record for **College World Series** career home runs.

He also might have saved the game.

Muth, who holds the record with six homers at Rosenblatt Stadium, hit a shot off Brian Tallet with a runner on in the second inning, but was robbed by Wright.

The 5-foot-11 Wright drifted back to the wall and timed his jump perfectly, pulling the ball out of the first row in the bleachers to keep LSU's 2-0 lead intact.

At the end of the inning the Tigers ran to the third-base line to greet Wright as he came in from the field, high-fiving him and slapping him on the back.

The Associated Press contributed to this report.

---- INDEX REFERENCES ----

NAMED PERSON: HODGES, TREY; FONTENOT, MIKE; HAWPE, BRAD; VAN HORN, DAVE; WRIGHT, RAY

ORGANIZATION: NATIONAL COLLEGIATE ATHLETIC ASSOCIATION; FLORIDA STATE UNIVERSITY; OUR LADY OF THE LAKE REGIONAL MEDICAL CENTER

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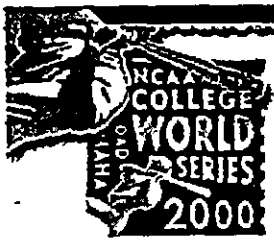

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1947: Eight teams were divided into two, four-team, single-elimination playoffs. The two winners then met in a best-of-three final in Kalamazoo, Michigan.

California beat Yale two games to none to win first baseball championship. Yale featured first baseman named George Bush.

1948: Four-team playoffs were changed to double-elimination tournaments Again in the finals, the two winners met in a best-of-three format in Kalamazoo.

1949: The final was expanded to a four-team, double-elimination format and the site changed to Wichita, Kansas Eight teams began the playoffs with the four finalists decided by a best-of-three district format.

1950: An eight-team, double-elimination format coincided with the move to Rosenblatt Stadium in Omaha in 1950. This format would continue until 1988.

The baseball committee chose one team from each of the eight NCAA districts to compete at the College World Series. This procedure would continue until 1954.

Jim Ehrler of Texas threw first CWS no-hitter against Tufts. Texas became first team to defend title after also winning title in 1949.

1954: District playoffs were conducted to determine the eight CWS participants. The baseball committee could declare an institution as the district representative to Omaha, or stage two-, three-, or four-team tournaments, depending upon the strength of each district for that particular year, thus accounting for the fluctuation in the size of the field. Maximum tournament field size was 32 from 1954 until 1971.

From 1972 to 1974 the maximum was 34 with district three permitting as many as six teams.

1960: Jim Wixson of Oklahoma State threw second CWS no-hitter against North Carolina.

1970: Southern Cal beat Florida State, 2-1, in 15 innings.

1972: CWS teams played a record eight, one-run games out of 15 total. The one-millionth fan attended the CWS.

1974: First year for designated hitter and aluminum bat. Southern Cal won its fifth consecutive CWS.

1975: The championship was changed to a regional format with eight four-team, double-elimination tournaments. This was also the first year more than one team from a conference could compete in the championship since the early 60's.

1978: Southern Cal won its 11th CWS title, the most of any team.

1980: ESPN covered selected CWS games for the first time.

1981: CWS teams hit a record 26 home runs.

1983: The two-millionth fan attended the CWS.

1984: CWS teams combine to score an average of 15 2 runs a game, an all-time high.

1987: Oklahoma State made its seventh straight CWS appearance, a record. The field was expanded to 48 teams.

1988: The eight regional champions were seeded into two, four-team brackets Those two brackets played double-elimination with the bracket winners then meeting in a one-game championship. CBS covered CWS championship game for the first time Stanford became the first team since Southern Cal to defend title.

1989: Wichita State became the first team outside the states of Arizona, California, Texas or Florida to win CWS since Ohio State in 1966.

1990: A record total of 138,426 fans watched the CWS, an average of 15,381 per session was also a record.

1991: A single-session record 18,206 fans watched Wichita State beat CWS host Creighton 3-2, in 12 innings. The three-millionth fan attended the CWS. CBS televised CWS championship game plus Game No 3.

1992: Pepperdine University completed an undefeated run at the CWS as it beat Cal State Fullerton, 3-2, to win its first Division I Baseball Championship.

1993: A record 173,296 fans attended the championship, including three sessions with over 20,000 fans.

1994: For the first time, all CWS games were televised live on either CBS, ESPN or ESPN2. An all-time record 21,503 watched the championship game and a record average of 17,960 attended the nine sessions.

1995: Attendance records were established for overall attendance (182,759) average per session of (18,276) and championship game (22,027). Cal State Fullerton defeated USC 11-5 for the national championship.

1996: A new average attendance per session record (20,281) shattered the old record set in 1995. LSU defeated Miami 9-8 for the title in one of the most dramatic finishes in 50 golden years of College World Series history.

LSU second baseman, Warren Morris, hit a two-run home run with two outs in the bottom of the ninth inning to secure the Tigers victory.

1997: The championship game crowd of 24,401 set the College World Series single-session attendance record. Overall attendance reached 204,309, marking the first tie it has surpassed 200,000. The average crowd per session (20,431) also set a CWS record. The four-millionth fan attended the CWS.

1998: Southern California outslugged Pacific-10 Conference rival Arizona State, 21-14, to win its 12th title before a championship-game record crowd of 24,456 June 6 at Johnny Rosenblatt Stadium in Omaha, Nebraska. A total of 42 College World Series records were broken and another 26 were tied. Among the most notable records shattered included most home runs by all teams in a series (62). team batting average (.318) and highest team batting average (Southern California, .378). In addition, nearly every offensive record for a College World Series championship game was broken.

1999: The 1999 College World Series marked the 50th year of this great event in Omaha, Nebraska The Miami Hurricanes, playing their sixth consecutive CWS, won their third national champion-ship by defeating Florida State in the title game.

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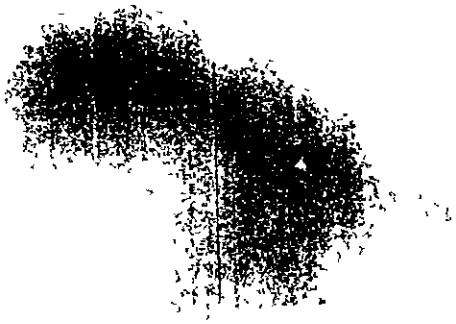

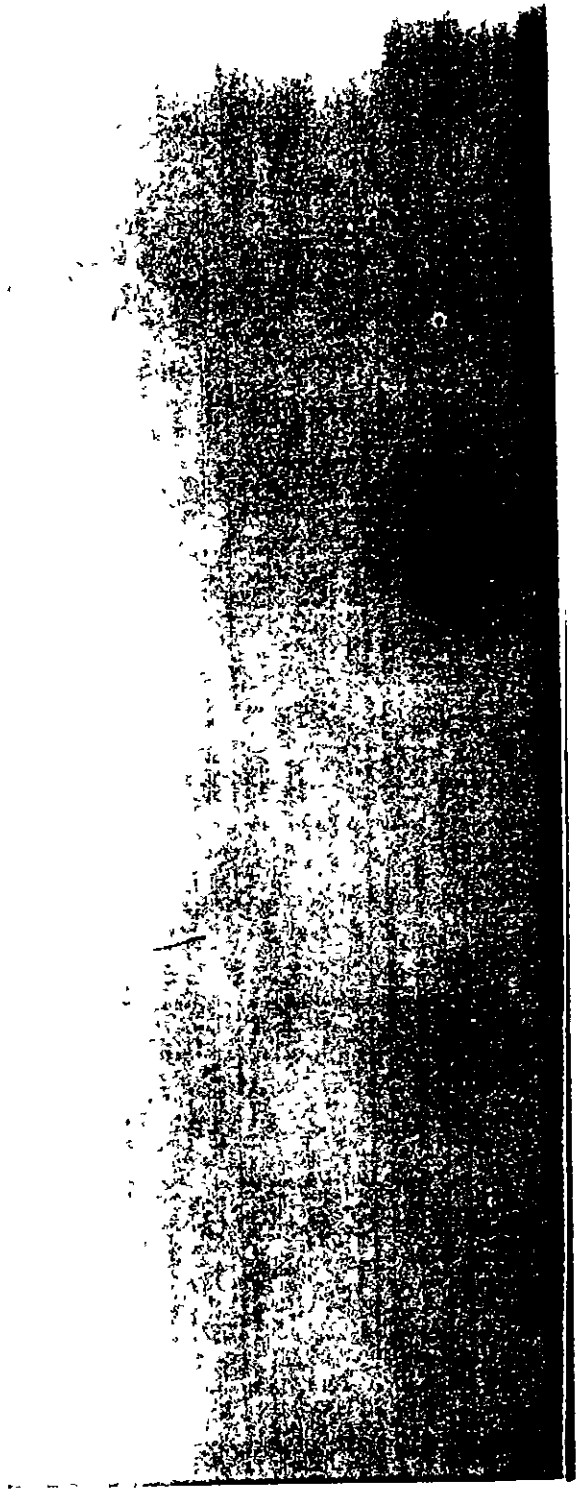

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The Atlanta Constitution

Wednesday, July 19, 2000

Sports

COLLEGE BASEBALL: LSU's Bertman retiring after season

STAFF REPORTS AND NEWS SERVICES

Skip Bertman, who built LSU baseball into a powerhouse, will retire after next season and turn over the coaching job to former assistant Raymond "Smoke" Laval.

Until then, Laval will be an administrative assistant with an emphasis on recruiting, said Bertman, whose teams have won five **College World Series**, including one this year.

"You can't replace a legend and I don't intend to," said Laval, who joined Bertman at a news conference Tuesday conducted by athletics director Joe Dean in Baton Rouge, La. "I'll just try to add on to what he has done."

Laval worked as an assistant to Bertman for 10 years until joining the University of Louisiana-Monroe as head coach for the 1994 season.

The two came to LSU together in 1983 when the dressing room did not have chairs, the dugouts did not have benches and the only thing on the walls in the training room "was food left over from the previous year," Bertman said.

At the time, LSU averaged about 200 fans per game.

Together, the two helped build a program that now attracts the largest number of fans in college baseball, according to university officials. Total **attendance** this year was 286,874, which averages 7,355 per game in a stadium that has a capacity of 7,760.

Dean said that after the 2001 season, Bertman will remain for another two years as an assistant athletics director to help rebuild and enlarge Alex Box Stadium.

During Bertman's tenure, LSU won the **College World Series** in 1991, 1993, 1996, 1997 and this year, LSU's 11th appearance in the **series** since the coach took over. Bertman and Rod Dedeaux of Southern

California, who won 10 national championships at Southern California from 1958-1978, are the only coaches with five NCAA baseball titles.

Laval, 44, recruited most of the players on LSU's first two national championship teams.

Dogs, Jackets are all-stars

Three Georgia Tech players and two from Georgia were named all-stars in the Cape Cod summer league. Georgia's Rob Moravek, a pitcher from Marietta, and Doc Brooks, an outfielder from Phenix City, Ala., were selected, along with Georgia Tech catchers Tyler Parker (Marietta), Bryan Prince (Ft. Oglethorpe) and outfielder Brad Stockton (Marietta). Brooks, starting in left field for the West, leads the league in runs scored (26), is second in home runs (six) and extra base hits (13) and is first in runs scored (26) for the Falmouth Commodores. Parker is hitting .323, fourth in the league. Moravek, a left-hander, is 4-2 with a 2.72 ERA in six starts.

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Graphic SKIP BERTMAN FILE Age: 62. Record: 826-308-2 (.728) in 17 seasons (1984-2000) at LSU. Titles: **College World Series** (five), SEC Tournament (six), SEC regular season (seven). Honors: National Coach of the Year (six). . . . SI Coach of the Year (seven). . . . Olympic bronze medal (1996).

---- INDEX REFERENCES ----

NAMED PERSON: BERTMAN, SKIP; DEAN, JOE; MORAVEK, ROB

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