

AFL Injury Report 1996

April 1997

Dr John Orchard

Dr Tim Wood

Dr Hugh Seward

Dr Adam Broad

AFL Medical Officers Association

INTRODUCTION

The AFL Injury Survey has now completed its fifth consecutive year, with 14 of 16 teams providing information during the 1996 season. This is the longest time that a professional sport in Australia has had continuous injury surveillance. The quality of the data has once again been improved, with reported missed games through injury checked with official AFL records of matches played. In 1996, when senior list players did not play a match on a given weekend, the specific reason was reported to the injury survey on 97% of occasions for the 14 participating teams.

Results for this report will be presented generally as a summary of the three seasons from 1994 to 1996. A summation of three years of injuries gives a better picture of overall injury rates than just reports from one year. However, it has been decided not to add injuries from the 1992 and 1993 seasons to the overall report for two reasons:

1. The quality of data obtained in 1992 and 1993 was not nearly as good as the latter three years and was not checked with official AFL match records. In particular, pre-season injuries were not recorded during these early years and hence the impact of long-term injuries (such as anterior cruciate ligament tears) was underestimated.
2. There were a number of changes made to the structure of the competition in 1994, which make comparison with previous years difficult. The most important of these was the institution of senior player lists for each club, which did not change for each team between March and October (ie. there has been no mid-season draft since 1993). This has meant that these specific players can be followed over the entire season and the survey can therefore be player orientated rather than injury orientated. Other changes in 1994 included expansion of the interchange bench to 21 players in senior football, changes to the length of quarters and time-on and return to a 22 round season (after a 20 round season in 1993).

The 1996 season has also seen a transition towards complete computerisation of the injury survey. Of the sixteen clubs, 5 provided data using a Microsoft Access database which was specifically designed for recording AFL injuries, 4 provided data on computer disc in a different format, 5 recorded injuries on paper and 2 (Footscray and Fitzroy) did not provide data by the deadline date. It is anticipated that at least 10 clubs will use the recommended injury database for season 1997.

The accuracy of records is now such that we have a very good picture of what injuries teams can expect during the home & away season, particularly which injuries will keep players from participating in matches. For injuries which contribute a substantial proportion of missed playing time, extra research is already under way which investigates the causes of such injuries and can lead to extra preventative measures. These will be mentioned further in the discussion section of this report.

METHODS

During the 1994, 1995 and 1996 regular seasons, injuries from players on the senior lists of AFL teams were monitored (41 of a possible 47 club seasons were included over the three years). All clubs had a defined senior list (usually of 42 players) which could not be changed throughout each season, totalling 1741 player seasons, which were monitored. Clubs fielded one team in the AFL senior (first) grade competition, which was selected entirely from the senior list. Each team played 22 regular season matches each year, which were played over 24 weeks in 1994 and 23 weeks in 1995 and 1996. Some clubs fielded a reserve grade team in the AFL competition, which was composed partially of senior list players, whereas other clubs allowed players not selected in the senior team to play in a different lower grade competition (WAFL, SANFL, QAFL). All surveyed players were given a player ID number. The definition of an injury was that it “caused a player to miss playing time during a match or be unable to be selected in a match or participate in a training session”. Injury details were recorded by a designated team medical official either on paper or using a computer database or spreadsheet. Injury details were player ID, diagnosis, side of injury, dates of onset and recovery, time of onset, recurrences, matches missed and surgery performed. The details were all entered in a standard format into a central database written in Microsoft Access. Diagnoses were coded using the OSICS coding system^{1,2,3}. Where more than one diagnosis was given for an injury, the most severe injury was coded. Within the database the codes were assembled in Diagnosis Related Groups (DRGs), which were determined from codes so that each group accounted for at least 2% of all injury occurrences or at least 2% of missed playing time.

All players had match participation details (for AFL senior and reserve grade games) checked through official AFL records. Where a player missed a regular season game that had not been identified, the team recorder was asked to explain that player’s absence. In most cases this was from injury, suspension, team bye, travelling as a ‘22nd man’ or personal reasons. AFL records were also used to note player age, height, weight and match scores. Team recorders were asked to note the dominant kicking foot for all players.

Injury incidences were calculated in four ways. Only injuries that had their onset during the regular season (from the start of the first round of matches to the end of the last round of matches) were considered when calculating injury incidence. Overall injury incidence was made considering all injuries over the dates mentioned and reported in units of injuries per 10,000 player weeks. Incidence of significant injuries was calculated in the same manner for any injury that caused subsequent missed match playing time. Match injury incidence was calculated taking into account those injuries whose onset was during a regular season game. Match duration was considered to be 80 minutes (ie. players were not considered at risk when play had stopped). Training injury incidence was calculated with injuries that occurred during training sessions. Training diaries were not kept, but time-at-risk was estimated to be eight hours per week per player. Match and training incidences were expressed in injuries per 10,000 hours.

Injury prevalences were calculated using regular season matches missed in the numerator divided by possible matches played and were expressed as percentages. Injuries that occurred in the off-season but caused matches to be missed in the regular season were taken into account when considering injury prevalence.

Significant injuries which occurred during first grade matches were analysed further with respect to closeness of game, city of game, match scores and stage of season. Injuries that caused missed time were analysed further with respect to player age, height, weight and body mass index.

RESULTS

Injuries were monitored comprehensively over the regular (home & away) seasons. This included injuries that occurred during the off-season but caused matches to be missed during the regular season. An injury was deemed to be 'significant' if it caused regular season matches to be missed. There was a large increase in the number of reported injuries in 1996, but a much smaller increase in the number of injuries that were 'significant'. There were more injuries in the pre-season period of 1996 that subsequently caused missed games during the regular season.

Table 1: Calculation of incidence data

	Season			Total
	1994	1995	1996	
Teams in AFL	15	16	16	47
Clubs in survey	14	13	14	41
Survey clubs with reserve grade teams	11	9	10	30
Players in survey	596	553	592	1741
Average age of players	22.49	22.59	22.79	22.64
Duration of regular season (weeks)	24	23	23	70
Matches per AFL team	22	22	22	66
Player weeks	14304	12719	13616	40639
AFL senior matches played (survey players)	6468	6006	6476	18950
Reserve grade matches played (survey players)	3506	2828	3120	9454
Injuries reported during season	1159	1494	2055	4708
Significant injuries during season	520	502	582	1604
Incidence of significant injuries (/10000 player weeks)	363.5	394.7	427.4	394.7
Significant off-season injuries	32	50	95	178

Injury incidence

The most commonly reported injuries were hamstring strains, both in terms of overall injuries and significant injuries. Groin injuries (with hernias, muscle and tendon strains all grouped together) were the second most common in both categories. Medical illnesses (eg. 'flu') were considered as injuries for the purposes of the survey and were common but generally minor. When considering match injuries only, thigh haematomas ('cork' thighs) were the most common injuries. The reported injury

rates in senior games were higher for most categories than for reserve games, with concussion and A/C joint injuries being exceptions. The injury rates in training were much lower (per hour) than matches, although players spend many more hours per week in training than playing matches. Training format varied at each club and was not recorded but generally consisted of mainly non-contact ball-handling and tactical drills, running and weights sessions.

Table 2: Reported injury incidence

Diagnosis Related Group (DRG)	Example of common injury in this category	Reported incidence (injuries/ 10000 player weeks)	
		All injuries	Injuries causing subsequent missed games
TOTAL		1158.5	394.7
Hamstring strain injuries	Hamstring strain	108.0	71.4
Groin injuries	Adductor tendonitis	88.1	41.8
Thigh haematomas	Cork thigh	80.2	12.3
Medical illnesses	Common cold	78.7	17.2
Ankle joint injuries	Sprain lateral ligament	78.2	22.1
Back & buttock injuries	Low back strain	74.3	24.9
Head/facial lacerations	Lacerated forehead	47.0	1.0
Trunk injuries	Fractured rib	38.9	12.3
Calf muscle strain injuries	Calf strain	38.1	16.5
Concussion	Minor head injury	36.4	8.4
Quadriceps strain injuries	Quadriceps strain	33.7	21.2
Wrist and hand sprains & dislocations	Dislocated finger	31.7	2.7
Shoulder joint injuries	Subluxation of shoulder jt	31.5	9.1
Upper limb fractures	Broken hand	28.3	18.2
Acromioclavicular joint injuries	A/C joint sprain	25.8	11.1
Knee cartilage/degenerative injuries	Medial meniscus tear	24.6	14.8
Knee medial ligament injuries	Medial ligament sprain	20.2	11.3
Lower limb stress fractures	Metatarsal stress fracture	8.6	6.4
Anterior cruciate ligament injuries	ACL rupture	7.9	7.9
Lower limb fractures	Fractured fibula	6.9	5.7
Posterior cruciate ligament injuries	PCL strain	6.2	4.7
Other head & neck injuries	Broken nose	37.2	8.6
Other knee injuries	Patellar tendonitis	54.6	15.3
Other lower limb haematomas	Corked calf	80.5	8.6
Other lower limb injuries	Achilles tendonitis	63.0	17.7
Other upper limb injuries	Corked arm	29.8	3.7

Table 3: Reported injuries during matches and training

DRG	Reported incidence (injuries/ 10000 player hours)		
	AFL senior matches	AFL reserve matches	Training sessions
TOTAL	924.5	692.6	20.58
Hamstring strain injuries	80.7	47.6	3.94
Groin injuries	60.2	52.4	2.37
Thigh haematomas	85.1	59.5	0.49
Medical illnesses	12.3	5.6	0.43
Ankle joint injuries	66.9	42.8	1.26
Back & buttock injuries	49.1	40.5	2.12
Head/facial lacerations	51.5	35.7	0.34
Trunk injuries	40.4	27.0	0.28
Calf muscle strain injuries	26.1	14.3	1.66
Concussion	31.3	46.8	0.03
Quadriceps strain injuries	21.8	14.3	1.63
Wrist and hand sprains & dislocations	27.3	27.8	0.49
Shoulder joint injuries	28.9	19.0	0.40
Upper limb fractures	27.7	19.0	0.34
Acromioclavicular joint injuries	20.6	29.4	0.18
Knee cartilage/degenerative injuries	18.6	20.6	0.49
Knee medial ligament injuries	19.0	10.3	0.28
Lower limb stress fractures	3.6	5.6	0.22
Anterior cruciate ligament injuries	8.7	2.4	0.06
Lower limb fractures	7.5	0.8	0.06
Posterior cruciate ligament injuries	5.9	5.6	0.06
Other head & neck injuries	34.8	29.4	0.34
Other knee injuries	43.5	25.4	1.17
Other lower limb haematomas	86.7	53.9	0.22
Other lower limb injuries	43.5	37.3	1.23
Other upper limb injuries	23.0	19.8	0.49

Injury prevalence

Causes of missed player games were determined for all survey players in 94% of cases during the three seasons. Injury was the most common reason for missing matches. Other reasons included the player being on a senior list but not training with that club, suspensions and byes. To compare injury prevalence between seasons, an estimated 'real' rate of injuries was calculated by adding a percentage of the unaccounted missed matches to those reported as missing through injury. This was done because the auditing of missed games was more accurate in 1996. Even with this adjustment, there were more matches apparently missed through injury in 1996 than the previous two seasons.

The most prevalent injury group was hamstring strains, closely followed by anterior cruciate ligament injuries of the knee, which were not common, but required a knee reconstruction in almost every case. Fractures were often severe injuries and hence accounted for significant amounts of missed playing time.

Table 4: Calculation of prevalence data

	1994	1995	1996	Total
Players	596	553	592	1741
Possible matches played	13112	12166	13032	38310
AFL senior matches played	6468	6006	6476	18950
AFL reserve grade matches played	3506	2828	3120	9454
Other matches played	852	1149	960	2961
Total matches played	10826	9983	10556	31365
Matches missed (total)	2286	2183	2476	6945
Matches missed from reported injuries	1628	1615	2012	5255
Matches missed from suspensions	92	36	65	193
Matches missed for other reasons	387	371	316	1074
Unaccounted missed matches	179	161	83	423
% missed matches accounted for	92.2	92.6	96.6	93.9
% missed matches due to injury	71.2	74.0	81.3	75.7
Real missed matches due to injury (estimate)	1755	1734	2079	5575
Reported injury prevalence (%)	12.4	13.3	15.4	13.7
Real injury prevalence estimate (%)	13.4	14.3	16.0	14.6

Table 5: Prevalence percentages by injury type

DRG	% of all missed playing time			
	1994	1995	1996	Average
Hamstring strain injuries	15.8	12.5	11.0	13.0
Anterior cruciate ligament injuries	11.2	11.8	14.0	12.5
Groin & hip injuries	8.7	7.7	8.4	8.3
Upper limb fractures	4.4	6.2	8.3	6.4
Knee cartilage/degenerative injuries	6.0	6.4	4.6	5.6
Back & buttock injuries	2.5	5.0	6.5	4.8
Lower limb fractures	3.6	8.1	2.8	4.7
Ankle joint injuries	3.6	5.5	4.2	4.4
Quadriceps strain injuries	5.6	2.4	4.3	4.1
Lower limb stress fractures	5.7	1.7	3.3	3.6
Shoulder joint injuries	4.6	4.1	2.1	3.5
Knee medial ligament injuries	4.6	2.7	2.7	3.3
Medical illnesses	1.3	4.2	3.4	3.0
Calf muscle strain injuries	2.3	2.1	3.6	2.7
Posterior cruciate ligament injuries	2.5	0.8	3.4	2.3
Trunk injuries	1.4	2.8	1.1	1.7
Acromioclavicular joint injuries	1.8	1.5	1.6	1.7
Thigh haematomas	0.9	1.5	1.7	1.4
Concussion	0.8	0.9	0.8	0.8
Wrist and hand sprains & dislocations	0.9	0.2	0.5	0.6
Head/facial lacerations	0.1	0.1	0.0	0.1
Other head & neck injuries	3.0	2.5	1.6	2.3
Other knee injuries	4.2	3.3	5.6	4.4
Other lower limb haematomas	0.7	0.9	1.4	1.0
Other lower limb injuries	3.7	3.6	1.9	3.0
Other upper limb injuries	0.2	1.4	0.8	0.8

Table 6: Estimated real injury prevalence (by percentage) for each round

Rnd	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Av.	10	11	13	13	14	14	14	14	15	14	14	16	17	15	14	15	15	16	17	16	16	16		
94	8	10	11	12	14	14	13	13	13	13	11	14	15	15	12	14	13	17	17	15	15	14	15	13
95	10	11	12	13	15	14	12	14	14	15	15	17	17	15	16	14	14	16	15	15	15	15		
96	12	13	15	15	14	15	16	16	16	13	15	18	18	16	15	16	17	16	18	18	20	18		

The injury prevalence was slightly higher in 1996 compared with the previous two seasons. Much of this difference was due to an increased number of pre-season and early season ACL injuries in 1996. The 1996 pre-season was longer than the other years because of the one-off Lightning Premiership at the start of February. Injury prevalence increases slowly but constantly during the first half of the season as chronic injuries start to accumulate. Approximately 14% of players are missing through injury during the first half of the season and 16% during the second half of the season, on average. The 1994 season had only 15 teams, so all teams had two byes during the course of the 24 week season. Seven teams had byes in Round 6 that year, which may have lowered the prevalence slightly in Round 7. In 1995 and 1996 there was a 23 week season, with all teams having a week's break for State-Of-Origin matches after Round 11 in 1995 and after Round 9 in 1996. In 1996 the break seemed to have a positive effect on the injury prevalence, but the reverse happened in 1995 (due to a spate of serious injuries just before the break).

Injury recurrence

Table 7: Recurrence percentage for each injury type

DRG	% which were recurrences
All injuries	17.6
Acromioclavicular joint injuries	14.3
Ankle joint injuries	20.1
Anterior cruciate ligament injuries	18.8
Back & buttock injuries	31.5
Calf muscle strain injuries	13.5
Concussion	3.4
Groin injuries	33.5
Hamstring strain injuries	26.9
Head/facial lacerations	1.0
Knee cartilage/degenerative injuries	43.0
Knee medial ligament injuries	15.9
Lower limb fractures	21.4
Lower limb stress fractures	14.3
Medical illnesses	7.5
Other head & neck injuries	6.6
Other knee injuries	32.0
Other lower limb haematomas	5.5
Other lower limb injuries	27.7
Other upper limb injuries	7.4
Posterior cruciate ligament injuries	20.0
Quadriceps strain injuries	22.6
Shoulder joint injuries	23.4
Thigh haematomas	3.4
Trunk injuries	9.5
Upper limb fractures	8.7
Wrist and hand sprains & dislocations	7.8

Anthropometry and injury

Table 8: Average matches missed per season by player age

Age	Average matches missed per season
17	2.3
18	1.8
19	2.3
20	2.7
21	2.2
22	3.0
23	3.2
24	3.4
25	3.4
26	3.9
27	3.9
28	4.0
29	3.0
30	3.6
31	1.9
32	3.3

Older players were more likely to be injured than younger players. Injuries that were more common in older players included calf strains, back & buttock injuries, knee cartilage injuries and hamstring strains. Lower limb stress fractures and A/C joint injuries were more common in younger players. From the data in Table 1, it is noted that there was a slight increase in the average player age over the seasons 1994 to 1996. This may have accounted for some of the increase injury rates over this time period.

Achilles and patellar tendonitis were more common in taller (& heavier) players. In general, injuries that occurred in older players also showed a correlation with weight, as older players tended to be heavier. There were slightly more injuries on the players dominant body side, but for the majority of injuries the side of body distribution was roughly even. Of individual injuries, quadriceps strains and hand injuries were more common on the dominant body side. Patellar tendonitis was more common on the non-dominant side.

Match conditions and injury

Injuries in total and for most categories were most common in the second quarter of matches and least common in the last quarter. Muscle strains defied this trend and were spread more evenly throughout the matches, with calf injuries occurring most often in the last quarter. Matches in which the final scores were close had a more even distribution of injuries than matches which were won easily (in which the last quarter had less injuries) although there was no significant difference in the overall injury rate between close games and games with big margins.

Matches in which scoring was low (under 20 goals scored in total by both teams) had a lower injury rate than matches which had average or high scoring.

Matches played in Melbourne had a lower injury rate than matches played in other cities, for both Melbourne teams and non-Melbourne teams. Alternatively expressed, Melbourne teams had higher injury rates when playing interstate, but non-Melbourne teams had higher injury rates when they played at home (and higher injury rates overall than Melbourne teams).

There was no significant difference in injury rate between games played at night and games played during the day.

DISCUSSION

Overall injury prevalence

The overall injury rate has increased slightly over the period of 1994 to 1996, which can be compared directly using the data from the survey. Much of the increase seen was in injuries during the early part of the season. In 1996, the rate of anterior cruciate ligament tears early in the season was higher than usual, which will be discussed both below and in a separate report. Even with the large number of injuries occurring, it is difficult to determine whether trends upwards or downwards for injuries of certain categories are significant.

The overall injury rates over a larger number of years can be also examined from AFL records of senior game injury payments, which have been kept from 1988 to the present. These confirm a rise over the period 1994 to 1996, but the injury prevalence in 1996 is still below all years from the period 1988-1991. During the time on record, the lowest injury prevalence recorded was in 1993.

Table 9: Factors that may affect the overall injury prevalence

	Estimated Rounds senior injury prevalence (%)	Start date of pre- season comp.	Non- Melbourne teams in league	Byes	Number of finalists	Melbourne rainfall (mm) (12 months since previous October)	Players on interchange bench
1988	17	22 Mid Feb	3	No	5	587	2
1989	18	22 Early Feb	3	No	5	879	2
1990	18	22 Early Feb	3	No	5	665	2
1991	17	22 Early Feb	4	Yes	6	721	2
1992	15	22 Early Feb	4	Yes	6	646	2
1993	12	20 Mid Feb	4	Yes	6	868	2
1994	14	22 Late Feb	4	Yes	6	700	3
1995	15	22 Late Feb	5	No	8	705	3
1996	16	22 Early Feb	5	No	8	868	3
1997	N/A	22 Late Feb	6	No	8	N/A	3

From the data presented in Table 9 and the current injury survey, it is suggestive that there is a higher overall injury rate if the grounds are harder. Support to this hypothesis is given by:

1. The higher rate of injury on interstate grounds compared to Melbourne grounds.
2. The lower rate of injury in matches where scoring is low (presumably correlating with softer and wetter grounds).
3. The high rate of ACL injuries in the pre-season and early in the seasons (when the grounds are presumably harder).
4. The low rate of injuries in 1993 when there was high rainfall in Melbourne (although other contributing factors, such as a lower number of rounds and the presence of byes may have been more significant).

At this stage, there is not enough data to compare injury rates in wet versus dry conditions for most specific injury categories. It is plausible that on a harder surface, the game would be played at a faster pace and the amount of jarring would be greater, so that both contact and overuse injuries may have a higher rate. On a wetter surface, there may be more likelihood of players slipping and the ball may be heavier which could mean that some specific injury types defy the trend to be more common on hard surfaces.

It seems likely that the start date for the pre-season competition, which determines the overall length of the season, is correlated to the number of injuries. In 1996, the season effectively started earlier for all teams because of the one off Lightning Premiership. This may explain why the injury prevalence in Round 1 was higher than in 1994 and 1995.

The elimination of byes and increase in the number of teams outside Melbourne in recent years may be good for the structure of the competition as a whole but may have inadvertently had a slightly negative impact on injury rates. As previously mentioned, the average age of players has slightly increased over the years 1994 to 1996, which would also have had a negative effect on injury rates.

Knee anterior cruciate ligament tears

There were an increased number of ACL tears in 1996, with a significant number of these occurring in players who had suffered the injury in the same knee previously. These will be discussed in a separate report⁴. It is possible that more aggressive rehabilitation techniques, which have been designed in recent years to return players to competition quickly after surgery and decrease post-operative knee stiffness, have contributed to an increased number of recurrences. This is a major focus of AFLMOA research, which will be further discussed. At the moment, decisions on return to play from ACL surgery are made entirely at the club level by the doctor, surgeon, physiotherapist, coach and player involved.

Hamstring strains

Hamstrings are the most common injury and cause more missed time through injury than any other injury category. Their prevalence in 1996 was lower than in 1994 and it appears as if the rates of these injuries are slightly decreasing over recent years. A preliminary report on low strength as a preventative risk factor will be made this year⁵. There is potential for more work to be done in this area and reductions in the injury rates to be made. In 1998, a pilot group of clubs will undertake an interventional program (to be designed this year) to attempt to reduce the rate of hamstring injuries.

Groin injuries

Groin injuries are another area of particular concern, given their high rates and apparently divergent views on the diagnosis in many cases. A number of operations are performed on the groin area each season, including hernia repairs, adductor tenotomies, obturator nerve releases and pubic symphysis debridements. The indications for these are not well defined and the decision-making process as to which operation to perform, if any, appears to differ widely across the various clubs. During 1997, a design for an evidence-based paradigm for dealing with chronic groin injuries will be made by an AFLMOA panel and distributed to clubs for 1998.

Notes on other injuries

There is good news to originate from the AFL injury survey. There were no life-threatening or catastrophic spinal injuries to occur in 1996 and it has been over 20 years since the single recorded case of a catastrophic injury occurred in VFL. In the time elapsed since this tragic occurrence, over 200,000 player games have been played without a death or major spinal injury. The tribunal system and umpires are to be commended for making the rates of serious head and neck injuries very low at AFL level.

The rates of concussion injuries causing missed games and recurrences of these injuries are also very low. This validates current AFLMOA practice of preseason neuropsychological testing as a method of determining safe but quick return to play from minor episodes of concussion. There is a slightly higher incidence of concussion in younger players and in reserve grade, but again this is a low figure overall, particularly compared to the rugby codes⁶.

Stress fractures are more common in younger players and their incidence has probably risen in recent years due to the increased number of 17-19 year old players training on senior lists. The increase in minimum age for drafting is most likely to have a positive impact on these rates. It is fortunate that most players can be expected not to have recurrences of stress fractures later in their careers, once their bones have matured more fully.

What the injury survey doesn't show

AFL Injury Survey data is now of an outstanding quality with respect to other Australian sporting competitions and also excellent by international standards. The major area for improvement in the future will be to investigate the reasons for player retirement and delisting. There are occasions in which injuries contribute to the ending of a player's career and from a player welfare perspective, it is important that these are documented.

In the future, it will also be of value to investigate the relationship between injuries and intensity of training. It is currently a major challenge for coaching, medical and fitness staff to optimally prepare players for competition without excessively creating overuse injuries.

Acknowledgments:

The authors would like to acknowledge the contributing personnel from clubs in 1996: Peter Waldie (Adelaide), Jim Eustace (Brisbane), Dr Peter Baquie (Carlton), Dr Andrew Jowett (Collingwood), Bruce Connor (Essendon), Dr Ken Withers (Fremantle), Paul Costa (Geelong), Chris Ward (Hawthorn), Dr Andrew Daff (Melbourne), Dr Con Mitropolous (North Melbourne), Dr Paul Blackman (Richmond), Peter Thomas (St. Kilda), Dr John Orchard (Sydney), Bill Sutherland (West Coast). We also thank the AFL for assistance with the preparation of this report, specifically Adrian Stewart, Ralph Lane, Ian Collins and Rod Austin.

REFERENCES

-
- ¹ Orchard J. Orchard Sports Injury Classification System (OSICS). In: Bloomfield J, Fricker PA, Fitch KD, eds. *Science and Medicine in Sport*. Melbourne: Blackwell, 1995:674-681.
 - ² Orchard J. Orchard Sports Injury Classification (OSICS). *Sport Health* 11(3): 39-41, 1993.
 - ³ <http://www.med.unsw.edu.au/physiology/teaching/external/sportsmed/Orchard/index1.htm>
 - ⁴ Seward H, McGivern J, Hood S. AFL 15 year survey of ACL Injuries (in press).
 - ⁵ Orchard J, Marsden J, Lord S, Garlick D. Preseason hamstring muscle weakness associated with hamstring muscle injury in Australian Footballers. *Am J Sports Med* 25: 81-85, 1997.
 - ⁶ Seward H, Orchard J, Hazard H, Collinson D. Football injuries in Australia at the elite level. *Med J Aust* 159: 298-301, 1993.