Indiana University Athletics
Concussion Management Protocol

The Indiana University Department of Intercollegiate Athletics Concussion Management Protocol follows the direction and guidance of the NCAA's Concussion Safety Protocol Committee (Committee) and is compliant with a concussion management plan recommended by the Committee. It is a dynamic protocol that will be reviewed and edited as necessary to remain consistent with the most recent best practices of concussion management as set forth by the Committee.

Introduction:

Concussion management is challenging due to the fact that concussion risk is highly individualized. A blow to the head with the exact same forces will yield different symptoms of differing severity depending on the individual concussed. Additionally, the brain is dynamic, especially in the developmental years of youth and adolescence, and is influenced by a multitude of other factors (i.e. sleep deprivation, dehydration, fatigue, depression, ADD/ADHD, headache disorders, drugs and supplements etc.).

International experts have convened at conferences on five occasions, most recently in Germany in 2016, in attempts to form consensus statements on the management of sports-related concussion. What has resulted is a recommendation to abandon the concept of categorizing concussions by "grades" or labeling them as "simple" or "complex" based on signs, symptoms, and severity at presentation for the purpose of making return-to-play decisions. This supports the realization that sports concussion diagnosis and management needs to be individualized, and does not lend itself to a "cookbook" approach. Noting this premise, some fundamental principles apply to concussion management.

Definition:

Concussion is a complex pathophysiological process affecting brain function and induced by traumatic biomechanical forces. Concussion may or may not result in a loss of consciousness. It is most commonly characterized by the rapid onset of a constellation of physical, cognitive, emotional and sleep-related symptoms. Symptoms may last from several minutes to days, weeks, months or even longer in some cases. A working diagnosis of concussion includes two criteria: 1.) A mechanism of injury to the head or an "event" which can involve direct or indirect forces and 2.) That event results in one or more of the common symptoms associated with concussion and/or any sign of a concussion (Table 1).

Pre -Season Education:

Treatment of concussion in sports is a team endeavor. Education of the student-athletes, coaches, team physicians, athletic trainers, Director of Athletics and other administrators and academic personnel about concussion and the potential for chronic or permanent injury is essential to their understanding and cooperation with treatment. Time will be allotted in a preseason team meeting for education of the coaches and student-athletes about concussive injuries and the procedural guidelines for treatment of concussion are received by each player and coach.

Each student-athlete and coach has the responsibility to report events or behaviors that might indicate that a concussion has occurred. Student-athletes will sign a statement in which they accept the responsibility for reporting all of their injuries and illnesses to the medical staff, including signs and symptoms of concussions (Appendix G). All Indiana University student-athletes, coaches, team physicians, athletic trainers and the Director of Athletics will annually be provided NCAA concussion fact sheets (or other applicable material) and will annually sign a statement to acknowledge they understand those fact sheets (and/or other concussion material provided), the concussion management policy, their role within

the policy and that they have received education about concussions and have had an opportunity to ask questions. Each student-athlete and coach will receive a copy of the sequence of events that will occur at practice or on game day if a concussion is suspected or diagnosed (Appendix A). Recent guidelines from the Big Ten Conference and NCAA have emphasized that protocols are moving from best practices to regulatory standards by the conference, taking what were once recommendations by the NCAA and making them official policy with consequences for violation. Under the new standards the Big Ten Conference will issue penalties for failure to comply with reporting requirements and rules on removing players from the field and other aspect of the association's concussion guidelines.

Pre-Participation Assessment:

Every student-athlete will receive at least one pre-participation baseline concussion assessment that addresses brain injury and concussion history, symptom evaluation, cognitive assessment and balance evaluation. The team physician will determine pre-participation clearance and/or the need for additional consultation or testing. In any student-athlete with a documented concussion, especially those with complicated or multiple concussion history, a new baseline concussion assessment will be considered six months or beyond the initial baseline concussion assessment. Additionally, any history of migraine/headache disorders, ADD/ADHD or other learning disabilities, psychiatric or sleep disorder and drug or alcohol abuse will be recorded and considered in the assessment. The baseline concussion assessment will be stored electronically and will be accessible at practices or competition. This comparison allows for a more accurate assessment of the injury. The pre-participation assessment will also include a more detailed baseline computerized neurocognitive testing of the student-athlete's speed and memory function (ImPACT® test). Such testing aims to serve as an objective technique to assess neurocognitive function in an uninjured state.

Recognition and Diagnosis of Concussion:

Medical personnel with training in the diagnosis, treatment and initial management of acute concussion are present at all NCAA varsity competitions in the following contact/collision sports: basketball; field hockey; football; pole vault; soccer and wrestling. Such trained medical personnel are present on site at the campus or arena of the competition. Medical personnel may be from either team, or may be independently contracted for the event. Also, medical personnel with training in the diagnosis, treatment and initial management of acute concussion are available at all NCAA varsity practices in the following contact/collision sports: basketball; field hockey; football; pole vault; soccer and wrestling. To be available means that, at a minimum, medical personnel can be contacted at any time during the practice via telephone, messaging, email, beeper or other immediate communication means. Further, the case can be discussed through such communication and immediate arrangements can be made for the athlete to be evaluated.

If a student-athlete is diagnosed with or suspected of having experienced a concussion based on signs/symptoms/behaviors consistent with a concussion, they will be immediately removed from the activity (i.e. practice, competition and/or conditioning) and not allowed to return to activity that day if a concussion is confirmed. They will be evaluated by the Certified Athletic Trainer (ATC) and/or Team Physician with concussion experience. If the injury occurs in the sport of football, the student athlete is taken to the athletic training room for evaluation. If the injury occurs at a venue without an official designated athletic training room, the evaluation will be made in the most appropriate setting as determined by the medical staff. As part of the evaluation, a history will be taken from the patient about their injury. A standardized "sideline" evaluation for concussion (SCAT5 - Appendix B) and vestibular ocular motor screening (VOMS) will be performed and compared to their baseline SCAT5 and VOMS. This evaluation will be part of an initial suspected concussion evaluation management plan which will also include a symptom assessment, physical and neurological exam, cognitive assessment, balance

exam and clinical assessment of cervical spine trauma, skull fracture and intracranial bleed. Additionally, observation of the injury event by the medical staff, coaching staff and game officials can also provide valuable information in determining if a concussion injury has occurred. If it is determined that a concussion has occurred, the student athlete will be monitored by a designated staff member and will remain in the athletic training room (in football and in other sports if possible) or locker room and not return to practice, competition or conditioning.

In the sport of football, a trained, unaffiliated certified athletic trainer with previous sideline experience will be stationed in the replay booth as an "eye in the sky" to observe players that might have sustained a concussive injury not witnessed by on-field personnel. This person will have the capability of communicating with (a) the field referee who can stop play for the potentially injured student-athlete and (b) the sideline medical staff of each team to alert them of a potentially injured player. This person also has access to video replay to further evaluate the play where the player might have been concussed. Additionally, IU Athletics will have a neurosurgeon on the IU sideline at each home and away football game to assist in the diagnosis and evaluation of potential concussed players.

Post-Concussion Management:

The immediate evaluation of the head-injured athlete will include an assessment of airway, breathing and circulation (ABC's), cervical spine, skull fracture as well as any signs of a more serious head injury to determine if a controlled, stabilized removal from the field and transportation to the nearest hospital is necessary. Conditions that would require transport to a designated hospital for further medical care are for any of the following: Glasgow Coma Scale score of <13, a prolonged loss of consciousness, focal neurological deficit suggesting intracranial trauma, repetitive vomiting, persistently diminishing/worsening mental status or other neurological signs/symptoms or a spine injury. One of the medical personnel will observe/monitor the concussed student-athlete for any deterioration in their neurological status which might require further evaluation at a designated hospital. Prior to leaving the practice or competition venue, the athlete will be re-examined and if medically stable, will be discharged with a responsible adult (typically a roommate, friend or family member) and both are given oral and written care instructions to follow until they are seen for a follow-up medical appointment (Appendix C). The student-athlete is treated with both physical and cognitive rest at the direction of the team physician. As part of the treatment process, the team physician will evaluate a student-athlete with a prolonged recovery in order to consider best management options and additional diagnosis, such as post-concussion syndrome, sleep dysfunction, migraine or other headache disorders, mood disorders such as anxiety and depression, and ocular or vestibular dysfunction. Research has shown that determining the functional integrity of the concussed athlete's brain also requires neurocognitive testing and this modality is being used as part of the standard of care for the diagnosis and treatment of concussion. All student-athletes receive a baseline computerized neurocognitive test (ImPACT®) prior to starting their collegiate athletics career. Following a concussion, a repeat test will be performed and test performance must return to the baseline level prior to being fully cleared for return-to-play participation. Physical rest precludes exertional activity including sport specific drills, practices, games, weight lifting and conditioning.

Return-to-Play:

The final determination of return-to-play of a concussed student-athlete is from the team physician or medically qualified physician designee. In a concussed student-athlete with a complicated or prolonged course the team physician will make the final return-to-play decision after consultation with a concussion management team which may include one or more of the following: a neurosurgeon or other neurospecialist, a neuropsychologist, a vestibular/ocular motor therapist. The duration it takes to

return to activity is completely individualized to the particular student-athlete and is not based on an arbitrary timeframe. Any student-athlete with a concussion must undergo a supervised stepwise progression management plan by a health care provider with expertise in concussions that specifies that the concussed student-athlete will have limited physical and cognitive activity until he/she has returned to baseline, then progresses with each of the following steps without worsening or new symptoms:

1. Rest and recovery (routine daily activities as tolerated).
2. Progression starts with light aerobic exercise without resistance training (such as biking or jogging for 15-20 minutes), with gradual and steady increases in exertion if the athlete remains without symptoms.
3. Sport-specific exercise and activities are introduced without contact or head impact.
4. Non-contact practice with progressive resistance training.
5. Unrestricted training.
6. Full, unrestricted return-to-competition.

This progression can take anywhere from days to weeks and the speed with which the athlete moves through this progression and returns-to-play is dependent on multiple factors and is guided by the medical team. Some of these factors include the clinical signs and symptoms, prior concussion history (number, remoteness, and severity), history of ADD/ADHD, learning disability, psychiatric history, sleep disorder, history of migraine headaches, age, sport, position, and the athlete's lack of hesitancy to return. It is essential that the athlete is completely asymptomatic before any final clearance to return-to-play. (For football specific please see Appendix F).

Return-to-Learn:

In addition to physical symptoms, concussed student-athletes often experience cognitive symptoms and have difficulty performing at their normal academic level. Cognitive rest may necessitate not being able to attend classes and having to observe academic accommodations which reduce the workload on the brain. The timeframe and nature of the classes and assignments missed will be determined by the team physician. The team academic advisor will serve as the point person within IU Athletics to navigate return-to-learn with the student-athlete. Student-athletes may fall behind in their studies and may not be able to take tests until their brain recovers. Formal guidelines in the form of Academic Accommodations (Appendix D) and Return-to-Learn Guidelines (Appendix E) are expressly a part of this concussion management policy. The student-athlete's concussion symptoms should guide the academic workload and weaning and eventual discontinuance of accommodations and restrictions. When the symptoms have resolved with activities of daily living including cognitive activities, the athlete must undergo a sport-specific activity progression program without recurrence of symptoms as outlined in the Return-to-Learn Guidelines.

Potential Complications or Sequelae of Concussions:

Symptoms and signs of concussion in a small percentage of cases may be prolonged and a diagnosis of Post-Concussion Syndrome may be made requiring specialty consultation with a neuropsychologist or psychiatrist. Other symptoms or signs which include sleep dysfunction, migraine or other headache disorders, mood disorders such as anxiety and depression and ocular motor/vestibular dysfunction may be persistent and have to be individually addressed by a specialist or specific therapy. Those specialists have been identified and are part of the medical team.

Role of Imaging:

The role of imaging (CT scans and MRI) is very limited in the management of concussion and for most cases, not necessary. For most concussions, these studies are usually normal. These imaging studies do, however, have a role in evaluating the concussed athlete when a concern exists for associated injuries, such as skull or orbital fractures, intracranial bleeds and seizures, or if the athlete's symptoms persist or neurological status deteriorates.

Reducing Exposure to Head Trauma:

The recognition and management of concussion will continue to evolve as the knowledge base of concussive brain injury is advanced. Emphasis must continue to be placed on ways to prevent this injury. Prevention is potentially the highest-yield opportunity in the lexicon of concussion risk reduction. Changes in the rules of collision sports will be a significant key to the prevention of concussions. Launching one's body and using one's helmet as a weapon must be eliminated. Rule changes and enforcement are beginning to reflect these priorities.

Sources for safety procedures are found on the websites or organizations committed to athlete safety such as USA Football and the CDC. Coaches and athletes must also favor an atmosphere of competitive, but non-combative, competition. Collegiate players, their teams and their institutions set the example for young people who are beginning to play athletics and brain immaturity puts them at greater risk to sustain injuries. Safe play in all sports should become the example.

Consistent with the foregoing, a reducing head trauma exposure management plan has been established. This plan includes the following: adherence to Inter-Association Consensus: Year-Round Football Practice Contact Guidelines; adherence to Inter-Association Consensus: Independent Medical Care Guidelines; reducing gratuitous contact during practice; taking a "safety first" approach to sport; taking the head out of contact; and coaching/student-athlete education regarding safe play and proper technique.

Table 1:

Signs and Symptoms of Concussion

SIGNS	**SYMPTOMS**
Amnesia – prior to or after injury	Headache
Loss of consciousness (LOC)	Nausea and/or vomiting
Slurred/incoherent speech	Excessive drowsiness
Disoriented to time, place, person	Unable to focus, concentrate
Delayed verbal & motor responses	Feeling hazy, foggy, groggy
Vacant stare	Dizziness
Light sensitivity	Blurry/double vision
Loss of balance, feeling unsteady	Sensitivity to light/noise
Crying unexpectedly or inappropriate behavior	Confusion
Behavior or personality change	Not “feeling right”
Slow to get up	Feeling slowed down
Rubbing, squinting or blinking one’s eyes	
Grabbing or shaking the head	
Asking for ammonia capsule	
Atypical response to initial questioning	

Appendix A

Guidelines for Suspected or Diagnosed Concussion During Practice or Game

1. The student-athlete will be immediately removed from the practice or game.
2. An initial brief assessment for concussion will be made.
3. If a concussion is suspected the student-athlete will be taken to the athletic training room (in football and other sports if possible) and the SCAT5 will be repeated and compared to the baseline.
4. If a concussion is diagnosed the student-athlete will remain in the athletic training room (if possible) and not return to the field.
5. The concussed student-athlete will be monitored by one of the medical personnel for any deterioration of his neurological exam. If necessary the student-athlete will be taken to the emergency department for further diagnosis and treatment.
6. Before returning to their residence, the student-athlete will receive detailed instructions for him and his roommate or family to recognize if the situation is deteriorating.
7. An ImPACT© test will be done at the appropriate time and compared to the baseline (or normative data). Test performance must return to normal (as determined by the team physician) for return to play consideration.
8. Return to play is determined when all symptoms have resolved at rest, the neurologic examination is normal, the ImPACT© test has returned to baseline (or compares favorably to normative data) and the student-athlete has successfully passed a graded activity progression program without recurrence of concussion symptoms.
9. Documentation from the team doctor in consultation with other neurological specialists when applicable must be obtained.

Appendix B

SCAT5

BJSM Online First, published on April 26, 2017 as 10.1136/bjsports-2017-097506SCAT5

To download a clean version of the SCAT tools please visit the journal online (http://dx.doi.org/10.1136/bjsports-2017-097506SCAT5)

SCAT5©

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

DEVELOPED BY THE CONCUSSION IN SPORT GROUP

FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals[1]. The SCAT5 cannot be performed correctly in less than 10 minutes.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The SCAT5 is to be used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCAT5.

Preseason SCAT5 baseline testing can be useful for interpreting post-injury test scores, but is not required for that purpose.Detailed instructions for use of the SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

Key points

- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If an athlete is suspected of having a concussion and medical personnel are not immediately available, the athlete should be referred to a medical facility for urgent assessment.
- Athletes with suspected concussion should not drink alcohol, use recreational drugs and should not drive a motor vehicle until cleared to do so by a medical professional.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their SCAT5 is "normal".

Remember:

- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

1

IMMEDIATE OR ON-FIELD ASSESSMENT

The following elements should be assessed for all athletes who are suspected of having a concussion prior to proceeding to the neurocognitive assessment and ideally should be done on-field after the first first aid / emergency care priorities are completed.

If any of the "Red Flags" or observable signs are noted after a direct or indirect blow to the head, the athlete should be immediately and safely removed from participation and evaluated by a physician or licensed healthcare professional.

Consideration of transportation to a medical facility should be at the discretion of the physician or licensed healthcare professional.

The GCS is important as a standard measure for all patients and can be done serially if necessary in the event of deterioration in conscious state. The Maddocks questions and cervical spine exam are critical steps of the immediate assessment; however, these do not need to be done serially.

STEP 1: RED FLAGS

RED FLAGS:

- **Neck pain or tenderness**
- **Double vision**
- **Weakness or tingling/ burning in arms or legs**
- **Severe or increasing headache**
- **Seizure or convulsion**
- **Loss of consciousness**
- **Deteriorating conscious state**
- **Vomiting**
- **Increasingly restless, agitated or combative**

STEP 2: OBSERVABLE SIGNS

Witnessed ☐ Observed on Video ☐

Lying motionless on the playing surface	Y	N
Balance / gait difficulties / motor incoordination: stumbling, slow / laboured movements	Y	N
Disorientation or confusion, or an inability to respond appropriately to questions	Y	N
Blank or vacant look	Y	N
Facial injury after head trauma	Y	N

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS[2]

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

Mark Y for correct answer / N for incorrect

What venue are we at today?	Y	N
Which half is it now?	Y	N
Who scored last in this match?	Y	N
What team did you play last week / game?	Y	N
Did your team win the last game?	Y	N

Note: Appropriate sport-specific questions may be substituted.

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)[3]

Time of assessment			
Date of assessment			
Best eye response (E)			
No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4
Best verbal response (V)			
No verbal response	1	1	1
Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	4	4	4
Oriented	5	5	5
Best motor response (M)			
No motor response	1	1	1
Extension to pain	2	2	2
Abnormal flexion to pain	3	3	3
Flexion / Withdrawal to pain	4	4	4
Localizes to pain	5	5	5
Obeys commands	6	6	6
Glasgow Coma score (E + V + M)			

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?	Y	N
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?	Y	N
Is the limb strength and sensation normal?	Y	N

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6

Total number of symptoms:	of 22
Symptom severity score:	of 132
Do your symptoms get worse with physical activity?	Y N
Do your symptoms get worse with mental activity?	Y N
If 100% is feeling perfectly normal, what percent of normal do you feel?	

If not 100%, why?

_____

_____

_____

Please hand form back to examiner

3

STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)[4]

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score		of 5

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groups and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3: I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

List	Alternate 5 word lists					Score (of 5) Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
					Immediate Memory Score			of 15
					Time that last trial was completed			

List	Alternate 10 word lists					Score (of 10) Trial 1	Trial 2	Trial 3
G	Finger Candle	Penny Paper	Blanket Sugar	Lemon Sandwich	Insect Wagon			
H	Baby Elbow	Monkey Apple	Perfume Carpet	Sunset Saddle	Iron Bubble			
I	Jacket Dollar	Arrow Honey	Pepper Mirror	Cotton Saddle	Movie Anchor			
					Immediate Memory Score			of 30
					Time that last trial was completed			

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)

List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	**List E**	**List F**			
7-8-2	3-8-2	2-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0
9-7-2-3	2-1-6-9	3-9-2-4	Y	N	1
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0
4-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	N	1
2-6-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	4-2-7-9-3-8	3-1-7-8-2-6	Y	N	1
		Digits Score:			of 4

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan	0 1
Months Score	of 1
Concentration Total Score (Digits + Months)	of 5

4

STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

Can the patient read aloud (e.g. symptom check-list) and follow instructions without difficulty?	Y	N
Does the patient have a full range of pain-free PASSIVE cervical spine movement?	Y	N
Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N
Can the patient perform the finger nose coordination test normally?	Y	N
Can the patient perform tandem gait normally?	Y	N

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing[5]

Which foot was tested (i.e. which is the non-dominant foot) ☐ Left ☐ Right

Testing surface (hard floor, field, etc.) _____

Footwear (shoes, barefoot, braces, tape, etc.) _____

Condition	Errors
Double leg stance	of 10
Single leg stance (non-dominant foot)	of 10
Tandem stance (non-dominant foot at the back)	of 10
Total Errors	of 30

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

5

STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.

Time Started _____

Please record each word correctly recalled. Total score equals number of words recalled.

_____

_____

_____

Total number of words recalled accurately: of 5 or of 10

6

STEP 6: DECISION

	Date & time of assessment:		
Domain			
Symptom number (of 22)			
Symptom severity score (of 132)			
Orientation (of 5)			
Immediate memory	of 15 of 30	of 15 of 30	of 15 of 30
Concentration (of 5)			
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal
Balance errors (of 30)			
Delayed Recall	of 5 of 10	of 5 of 10	of 5 of 10

Date and time of injury: _____

If the athlete is known to you prior to their injury, are they different from their usual self?

☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**

(If different, describe why in the clinical notes section)

Concussion Diagnosed?

☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**

If re-testing, has the athlete improved?

☐ **Yes** ☐ **No** ☐ **Unsure** ☐ **Not Applicable**

I am a physician or licensed healthcare professional and I have personally administered or supervised the administration of this SCAT5.

Signature: _____

Name: _____

Title: _____

Registration number (if applicable): _____

Date: _____

SCORING ON THE SCAT5 SHOULD NOT BE USED AS A STAND-ALONE METHOD TO DIAGNOSE CONCUSSION, MEASURE RECOVERY OR MAKE DECISIONS ABOUT AN ATHLETE'S READINESS TO RETURN TO COMPETITION AFTER CONCUSSION.

Appendix C

INDIANA HOOSIERS

Concussion Information for Home

Athlete: _____ Date of injury: _____ Time: _____

Athletic Trainer/Physician: _____ Parent/Roommate: _____

You have been diagnosed with a concussion. Observation in the first 24 hours is critical to determine if your injury is more than a concussion with the possibility of causing more or worsening symptoms or signs. This is a guide for your roommates or family to follow over the first 24 hours post injury. Patient may use Acetaminophen (Tylenol) for pain but do not use aspirin or aspirin substitutes, no NSAIDS (ibuprofen, naproxen, Aleve, Advil) in first 48 hrs. post-injury. Do not use alcoholic beverages or illegal drugs. Do not drive.
If any of the following conditions occur, call the team athletic trainer immediately.

1. ***Change in Level of Consciousness:***
   A change in the level of consciousness is an early sign of worsening. The injured athlete should be awakened every 3 hours in the first 24-hour period and any change in the following symptoms must be reported.

Disorientation (Confusion)	Increased Dizziness	Slurred or Incoherent Speech
Progressive Memory Loss	Lack of Coordination	Inability to Arouse or Awaken
Inability to Function	Vacant Stare	Fainting
Worsening Ability to Concentrate	Lack of Awareness	

2. ***Personality Changes (Increase in any of following symptoms):***
   Irritability, Anxiety or Depression, Confusion, Excessive Emotion

3. ***Headache:*** Significant Increase in Severity
   New Onset Headache

4. ***Nausea and Vomiting:*** Increase in Severity should be reported

5. ***Weakness of Limbs or Loss of Coordination***

6. ***Convulsions / Seizures (Fits)***

*****If you have any doubt, seek medical attention IMMEDIATELY*****

Athletic Trainer Office: _____ Physician Phone: _____

Athletic Trainer's Cell: _____

Appendix D

Academic Accommodations Following Concussion

Indiana University Department of Athletics – Sports Medicine

Date: _____

Patient Name: _____ ***Sport:*** _____

Students recovering from concussions often exhibit cognitive symptoms that make attending school and learning difficult. They may not be able to attend classes or only partial classes. They often have light and nose sensitivity, headache, trouble focusing, concentrating and remembering. The accommodations listed below often help to lessen the symptoms and allow full participation sooner. Compliance with these accommodations allows the brain to recover more quickly. These students often do not appear ill, but they are.

The student is currently experiencing symptoms of concussion. Current Symptoms list:

____ Headache	____ Visual problems	____ Sensitivity to noise	____ Memory problems
____ Nausea	____ Balance problems	____ Difficulty concentrating	____ Sensitivity to light
____ Dizziness	____ Feeling foggy	____ Irritability	____ Fatigue

Class Attendance:

- ____ Full attendance, no restrictions
- ____ Attendance if symptoms allow and may leave early or take short breaks
- ____ No attendance, duration to be determined by signs and symptoms

Visual Stimulus:

- ____ Allow student to wear sunglasses
- ____ Limited computer, TV, bright screen use
- ____ Provide pre-printed class notes before class
- ____ Change classroom seating as necessary

Testing:

- ____ Additional time to complete test/quiz
- ____ No more than one test per day
- ____ Allow for scribe, oral response and oral delivery of questions
- ____ Postpone exams/quizzes

Workload/Multi-tasking:

- ____ Reduce homework as possible
- ____ Provide more time to complete assignments
- ____ No note taking – listening only
- ____ Allow student to record lectures

Additional Comments/concerns: _____

_____

_____

We will continue to update you on the patient's progress and recovery. We appreciate your support and assistance in helping this patient recover from their concussion. If you have any question, please feel free to contact us.

*****Indiana University Department of Sports Medicine (812)855-4509*****

Physician name: _____ Contact number: _____

Physician signature:_____

Appendix E

Guidelines for Return-to-Learn

1. Academic accommodations guidelines are given to the concussed student-athlete and a copy is given to their athletic department team academic advisor. No classroom activity will occur on the same day of the concussion.
2. The team academic advisor will serve as the point person to navigate academic adjustments/accommodations and return-to-learn aspects of the student-athlete.
3. Letter from head team physician documenting the injury and the recommendation of academic accommodations will be provided to course professors and instructors when necessary.
4. An individualized initial plan will be based on the student-athlete's tolerance of cognitive activity and will include: remaining at home/dorm if student-athlete cannot tolerate light cognitive activity and a gradual return to classroom/studying as tolerated, modification of schedule/academic accommodations for up to two weeks, as indicated, with help from the identified point person, re-evaluation by team physician and member of the multi-disciplinary team, as appropriate, for student-athletes with symptoms greater than two weeks, engaging campus resources for cases that cannot be managed through schedule modification/academic accommodations. Such campus resources must be consistent with ADAAA, and include at least one of the following: learning specialists, office of disability services or ADAAA office.
5. Continued medical follow up until complete recovery, including a re-evaluation by the team physician if concussion symptoms worsen with academic challenges.
6. Involvement of a multi-disciplinary team when necessary for more complex or prolonged cases. The multi-disciplinary team may include, but is not limited to:
    a. Team physician
    b. Athletic trainer
    c. Psychologist/counselor
    d. Neuropsychologist and/or other mental health professionals
    e. Faculty athletic representative, appropriate campus administrators
    f. Academic course professors, counselors and instructors
    g. College administrators
    h. Disability Services for Students (in Office of Student Affairs) representative
    i. Coaches
7. Compliance with the ADAAA.
    a. Engagement of ADAAA compliant campus resources when typical academic accommodations do not suffice.
8. Notification of the team academic advisor when accommodations are weaned or discontinued.

Appendix F

Activity Progression Program

Graduated Exertion Protocol for Concussion – Football

Steps	Activity	Objective
1. Rest and Recovery	*Routine daily activities as tolerated*	Recovery
2. Light Aerobic Exercise	*10 – 20 minutes on a stationary bike, treadmill, stair master with light to moderate resistance supervised by ATC. No resistance training or weight training. Duration and intensity of the aerobic exercise can be gradually increased over time if no symptoms or signs return during or after the exercise.*	Cardiovascular challenge to determine if there are any recurrent concussion signs and symptoms.
3. Continued Aerobic Exercise and Introduction of Strength Training	*With continued supervision by the ATC, increase the duration and intensity of the aerobic exercise (e.g. more intense or longer time on the bike or treadmill). Start some jogging and advance to running with short periods of time initially and then increase the time gradually. Introduction of gentle strength training under supervision.*	Progress cardiovascular exercise, add strength training and more complex movements to determine if there are any recurrent concussion signs or symptoms.
4. Sport Specific Conditioning and Position Specific Drills	*Continue #3 and add sprinting. Add conditioning non-contact drills (e.g. changing direction drills, cone drills, ladders). Add throwing, catching, running and other position-specific activities. Introduce ladder agility drills, L-Drill, Complete Circles Drill, Left and Right Spin Drill (see appendix F).*	Increase position specific drills to determine if there are any recurrent concussion signs or symptoms.
5. Football Specific Activities	*Ease into all non-contact activities starting at shorter time periods and advancing to typical duration of a full practice. Add red bags, sleds and position specific one-on-one gentle contact drills. Introduce Tango Drill, X-Drill, M- Drill, W-Drill, 6 Cone Drills and 5-10-5 Pro Agility Drill (see appendix F).*	Increased football specific demands to determine if there are any recurrent concussion signs or symptoms.
6. Full Football Activity/Clearance	*Full participation in practice and contact without restriction. **	

*Once the athlete is medically cleared, a coaching decision should be made regarding the athletes conditioning to return to full participation and on par and football ready with the other athletes. This will help avoid recurrent concussion or other injuries.

Activity Progression Program
(Graduated Exertional Protocol)
Modification for Concussions

General Information:

Each step is dependent on the length of time the athlete has been inactive physically. If an athlete has been inactive for an extended period of time they must notify the medical personnel or the coaches when they feel they have pushed themselves to their limit. The post injury limit on exertion will be significantly different than normal training. Extended time on each step may be necessary in these athletes and all activity is dependent on the recurrence of concussion symptoms. If symptoms recur, activity should be suspended until the symptoms have resolved for 24 hours and then resume activity at the same step or the preceding step.

Symptoms cannot be observed and only the athlete can relate if there are recurrent symptoms. Encouraging the athlete to immediately report recurrent symptoms as his activity progresses is crucial to protect him from recurrent injury. Athletes are anxious to please the coaches and to get back to their full activity as quickly as possible so intentional questioning by the medical staff and the coaches about symptoms are extremely important. The athlete should feel comfortable about relating symptoms to the medical staff and also to the coaches and not feel intimidated to acknowledge recurrent symptoms. Again the athlete must use symptoms as his guideline for stopping an activity.

Noncontact activity post-concussion must be strictly enforced during the return to play progression as motivation to perform and to impress the coaches is high with all of the players, injured or not.

Treatment of concussions is extremely restrictive both from physical activity and cognitive activity. It also affects their daily routine and they have restrictions on using electronics including their phone, video games and extended computer use. Attending team meetings especially if they are cognitively affected may slow down the recovery so they should be excused if symptomatic. They are usually very motivated to get back to their normal athletic activity and their cognitive activity so it is very unusual for them to use their concussion as a crutch.

Progression related to athletes position:

Lineman:

Both offensive and defensive linemen are subjected to hitting with each snap of the ball. Sled activity can be introduced at a reduced level in step 4. Modified time with hitting drills to evaluate return of symptoms is important in step 5. Avoid the Oklahoma drill.

Cornerbacks and Safety Positions:

These positions require greater expertise in speed, agility and ball handling. Emphasizing each with a reduced time component is important. Respecting the athletes own assessment of duration of each activity related to his endurance post-concussion is very important.

Quarterbacks Position:

This position requires expertise in agility, speed, ball-handling, passing and cognitive skills to integrate managing the game. Must watch not only for physical mistakes but cognitive mistakes in post-concussion injury. Respecting the athletes own assessment of duration of each activity related to his endurance post-concussion is very important.

Running backs:

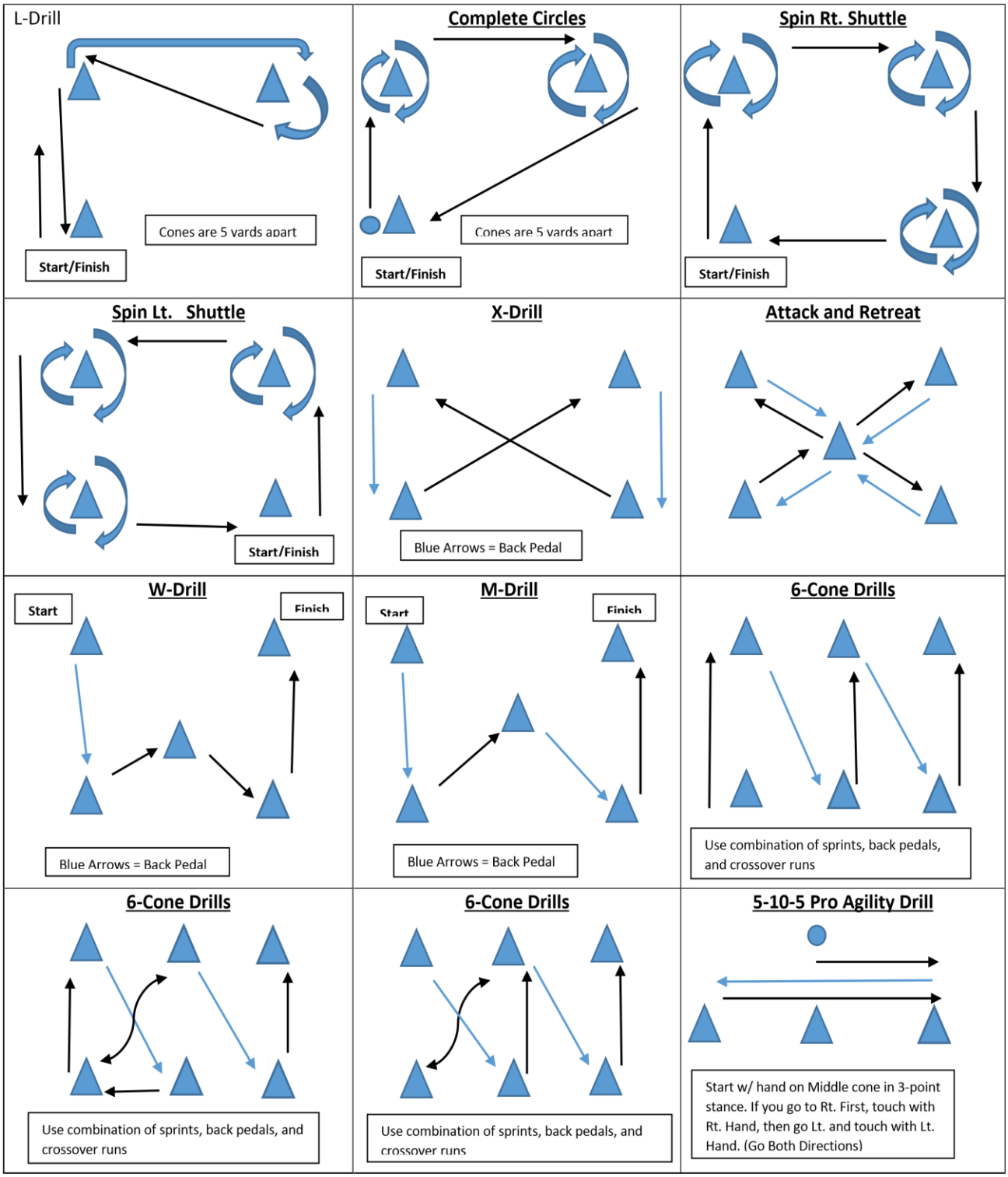
This position requires agility, speed, ball-handling, receiving. He is hit every time he runs the ball and tends to put his head down to gain more yards. This should be monitored closely especially in step 6. He must be encouraged to take his head as a weapon out of the game. Time of play in practice should be limited initially to judge his response. Respecting the athletes own assessment of duration of each activity related to his endurance post-concussion is very important.

Receivers and Tight Ends:

These positions require agility, speed, ball handling and risk of major hits while concentrating on catching the pass. Tight ends are also required to block frequently subjecting them to more contact. Close observation during step 6 with contact to see if athlete is hesitant when making receptions which might subject him to recurrent injury is important. Respecting the athletes own assessment of duration of each activity related to his endurance post-concussion is very important.

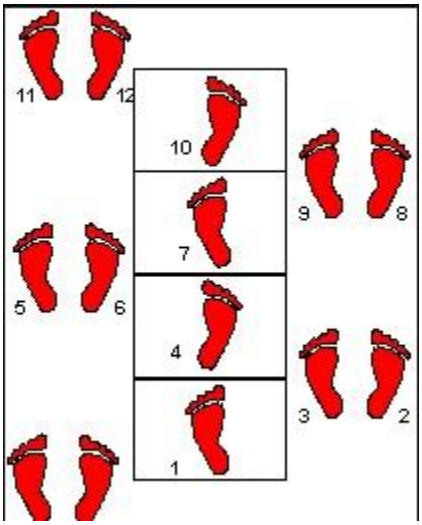
Cone Drills: 3-Cone/4-cone/5-cone/6-cones

On the 5 and 6 cones drills, use combination of sprint, shuffles, crossover run, and backwards run. (All cones are 5 yards apart). The 6-cone drills are 10 yards apart!



Tango Drill

Start with both feet outside of the first square and to the left. Cross your left leg over your right and into the center of the first square. Your right leg should immediately follow to the right of the first square, followed by your left leg. From here your right foot comes across your left and into the center of the second square as the pattern is repeated in the opposite direction Repeat for the full length of the ladder



Appendix G

Concussion Acknowledgement Form

I, _____ acknowledge that as a member of the Indiana University Department of Intercollegiate Athletics, I accept responsibility for supporting our Sports Medicine Department's policy on concussion management.

I understand that student-athletes may have a risk of head injury and/or concussion. I also understand the importance of reporting any such symptoms of a head injury/concussion to the sports medicine staff (i.e. team physician, athletic trainer). I also accept responsibility for reporting to the sports medicine staff any signs or symptoms that I may witness.

By signing below, I acknowledge that my institution has provided me with educational materials on concussion and given me an opportunity to ask questions about areas and issues that are not clear to me on this issue.

I have read the above and agree that the statements are accurate.

Signature_____