

Nathan M. Murata, Ph.D. Principal Investigator  
Department of Kinesiology & Rehab Science  
Ross S. Oshiro, MS, ATC, CSCS Project Director  
Coordinator, Queens Center for Sports Medicine  
Troy M. Furutani, MS, ATC Co-Project Director  
Department of Kinesiology & Rehab Science

---

---

---

---

---

---

---

---

### Acknowledgement



---

---

---

---

---

---

---

---

### Neurocognitive Testing

| School Year | # of Baselines | # of Concussions |
|-------------|----------------|------------------|
| 2010 - 11   | 4,683          | 446              |
| 2011 - 12   | 10,113         | 895              |
| 2012 - 13   | 10,496         | 1,140            |
| 2013 - 14   | 10,012         | 1,370            |
| 2014 - 15   | 9,451          | 1,008            |

---

---

---

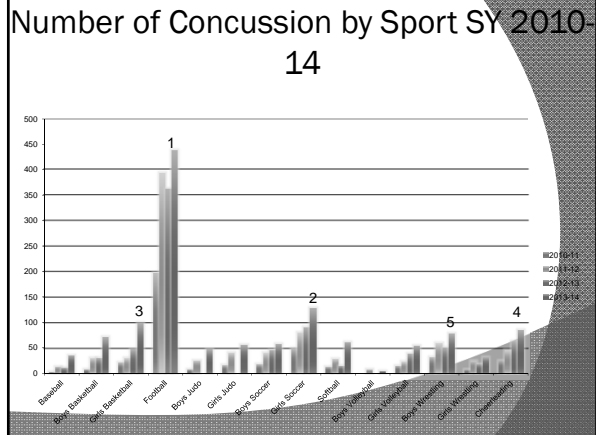
---

---

---

---

---




---

---

---

---

---

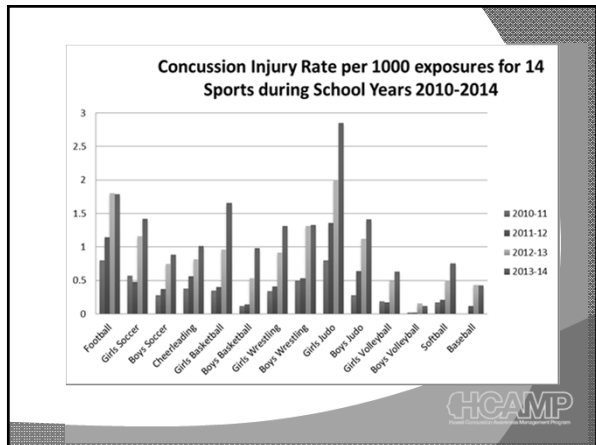
---

---

---

---

---




---

---

---

---

---

---

---

---

---

---

### Number of Days Missed Report from August 1, 2011 to July 31, 2014

| Days Missed                             | MEAN  | SD    |
|---|-------|-------|
| August 1, 2013 – July 31, 2014 (n=1370) | 26.15 | 25.17 |
| August 1, 2012 - July 31, 2013 (n=1140) | 26.2  | 18.98 |
| August 1, 2011 - July 31, 2012 (n=845)  | 23.5  | 16.5  |

---

---

---

---

---

---

---

---

---

---

### GRADUAL RETURN TO PLAY PROTOCOL

|         |  |
|---------|--|
| STEP 1. | COMPLETE COGNITIVE REST  |
| STEP 2. | RETURN TO SCHOOL FULL-TIME   |
| STEP 3. | LIGHT EXERCISE. THIS STEP CANNOT BEGIN UNTIL ATHLETE IS CLEARED BY THE TREATING PHYSICIAN FOR FUTURE ACTIVITY. AT THIS POINT, THE STUDENT/ATHLETE MAY BEGIN WALKING OR RIDING A STATIONARY BIKE. |
| STEP 4. | RUNNING IN THE GYM OR ON THE FIELD. NO HELMET OR OTHER EQUIPMENT   |
| STEP 5. | NON-CONTACT TRAINING DRILLS IN FULL EQUIPMENT. WEIGHT TRAINING CAN BEGIN.  |
| STEP 6. | FULL CONTACT PRACTICE OR TRAINING  |
| STEP 7. | PLAY IN GAME   |

*Note.* Steps 3-7 are supervised by the Athletic Trainer at the high school. Each step is separated by a minimum of 24 hours.

---

---

---

---

---

---

---

---

---

---

---

---

### Relationship between the Time in Each Step with the Return to Play Guideline

| n = 375                        | 2010-2012 | 2013-2014 |            |
|--------------------------------|-----------|-----------|------------|
| Cognitive Rest                 | 3.0       | 3.0       | Step 1 - 2 |
| Return to School Full Time     | 9.9       | 13.7      | Step 2 - 3 |
| Light Exercise                 | 2.0       | 2.3       | Step 3 - 4 |
| Run/No Equipment               | 2.1       | 2.2       | Step 4 - 5 |
| Non - Contact                  | 2.6       | 2.8       | Step 5 - 6 |
| Full Contact / no restrictions | 2.7       | 2.1       | Step 6 - 7 |

Shimizu et al. NATA Abstract 2013




---

---

---

---

---

---

---

---

---

---

---

---

### Establishing 3-day and 7-day symptom clusters for Hawaii high school student athletes during the first week of a sport-related concussion.

| Migraine/Cognitive          | Emotional                     | Somatic                         | Sleep                         |
|-----------------------------|-------------------------------|---------------------------------|-------------------------------|
| Drowsiness (.775)           | Feeling more emotional (.826) | Sleeping more than usual (.559) | Nausea (.786)                 |
| Fatigue (.734)              | Sadness (.791)                | Numbness or Tingling (.500)     | Trouble Falling Asleep (.694) |
| Feeling Slowed down (.697)  | Irritability (.659)           |                                 |                               |
| Headaches (.620)            | Nervousness (.621)            |                                 |                               |
| Vomiting (.612)             |                               |                                 |                               |
| Dizziness (.585)            |                               |                                 |                               |
| Sensitivity to noise (.518) |                               |                                 |                               |

Oshiro J. et al. Abstract NATA 2013




---

---

---

---

---

---

---

---

---

---

---

---

Establishing 3-day and 7-day symptom clusters for Hawaii high school student athletes during the first week of a sport-related concussion.

| Migraine/Cognitive              | Emotional                     | Somatic                  | Sleep                           |
|---------------------------------|-------------------------------|--------------------------|---------------------------------|
| Difficulty concentrating (.751) | Feeling more emotional (.887) | Vomiting (.817)          | Sleeping less than usual (.732) |
| Feeling mentally foggy (.718)   | Nervousness (.873)            | Numbness/tingling (.692) |                                 |
| Sensitivity to noise (.705)     | Sadness (.873)                |                          |                                 |
| Sensitivity light (.698)        | Irritability (.576)           |                          |                                 |
| Difficulty remembering (.683)   |                               |                          |                                 |
| Feeling slowed down (.670)      |                               |                          |                                 |
| Drowsiness (.666)               |                               |                          |                                 |
| Trouble falling asleep (.653)   |                               |                          |                                 |

Oshiro, J. et al. Abstract NATA 2013



---

---

---

---

---

---

---

---

---

---

---

---

### Future Direction

- Continue to provide concussion management resources to the high school setting.
- Start providing youth athletics with concussion resources
- Develop concussion education module in health education curriculum at certain grade levels

---

---

---

---

---

---

---

---

---

---

---

---



### Research Outcomes

Oshiro, R. S., Finer, L. M., Robbiecki, J., Shimizu, A., Slabicki, A., Wahl, T. P., Furutani, T. M., & Murata, N. M. (2014). Balance error scoring system baseline normative values for five contact sports in high school athletes. Far West Athletic Training Association Annual Meeting & Clinical Symposium, April 10-13, 2014, Las Vegas, NV.

Furutani, T. M., Oshiro, R. S., Murata, N. M., & Tsushima, W. T. (2014). Does having a neuropsychological baseline test influence the number of days to return to pre-morbid neuropsychological function? A pilot study. Far West Athletic Training Association Annual Meeting & Clinical Symposium, April 10-13, 2014, Las Vegas, NV.

Wahl, T. P., Oshiro, R. S., Finer, L. M., Robbiecki, J., Shimizu, A., Slabicki, A., Furutani, T. M., & Murata, N. M. (2014). Balance error scoring system baseline normative values for high school football. Far West Athletic Training Association Annual Meeting & Clinical Symposium, April 10-13, 2014, Las Vegas, NV.

Shimizu, A., Furutani, T., Kocher, M., Wahl, T., Oshiro, R., Tamura, K., & Murata, N. (2013). The relationship between the time in each step within a return to play guideline for sports-related concussion among high school student-athletes. National Athletic Training Association, Annual Meeting and Clinical Symposium, Las Vegas, NV, June 11-14, 2013.

Goeckeritz, L.M., Kanaoka, T., Uyeno, R. K., Oshiro, R.S., Furutani, T. M., Wahl, T.P., Kocher, M. H., & Murata, N. M. (2013). Sports-related concussion in Hawaii State Public Schools during 2010-2012. National Athletic Training Association, Annual Meeting and Clinical Symposium, Las Vegas, NV, June 11-14, 2013.

Kanaoka, T., Goeckeritz, L. M., Uyeno, R. K., Oshiro, R. S., Furutani, T. M., Wahl, T. P., Kocher, M. H., & Murata, N. M. (2013). Return to participation outcomes of concussed high school student-athletes during 2011-2012. National Athletic Training Association, Annual Meeting and Clinical Symposium, Las Vegas, NV, June 11-14, 2013.

Oshiro, J. Y., Oshiro, R. S., Uyeno, R. K., Tamura, K., Furutani, T. M., Wahl, T. P., Kocher, M. H., & Murata, N. M. (2013). Establishing 3-day and 7-day symptom clusters for Hawaii high school student athletes during the first week of a sport-related concussion. National Athletic Training Association, Annual Meeting and Clinical Symposium, Las Vegas, NV, June 11-14, 2013.

---

---

---

---

---

---

---

---

---

---

---

---