



## **POSITION STATEMENT ON BIO SENSORS AND RISK MINIMIZATION**

**National Federation of State High School Associations (NFHS)  
Sports Medicine Advisory Committee (SMAC)**

The NFHS Sports Medicine Advisory Committee (SMAC) was formed in 1996 to assist the NFHS in ensuring the safety of high school athletes across the nation. The NFHS SMAC regularly reviews equipment, playing rules, and products and considers their possible benefits and potential risks to young athletes. In an effort to address two serious medical conditions, concussion and exertional heat illness, companies have developed new products that claim to have the ability to warn coaches and athletes of impending danger. While the NFHS SMAC applauds the ingenuity of such designs, there is concern about the applicability of many of these products as they transition from the laboratory to the playing field. While this is not an exhaustive review of all available products on the market, the NFHS SMAC believes it is important to provide some guidance regarding their applicability on the playing field.

There are many new sports technology systems and biosensors in this rapidly growing section. Information in the form of readouts and sophisticated dashboards are readily available. Unfortunately the validation and usefulness of this information has not been defined in the scientific literature. While we want to encourage development of new technology, we cannot rely on non-validated technology until the science is verified.

### **Sensors Designed to Detect Concussion**

A variety of systems, using accelerometer technology, are available for purchase by schools or individuals. These systems are based upon the accelerometer measuring G forces at the time of impact. Previous research has found some correlation between measured G forces and the risk of sustaining a concussion. Unfortunately, this is very inexact science and no single impact force is “guaranteed” to cause a concussion. Thus, the monitor may signal that a force great enough to trigger a concussion has occurred and the athlete may be uninjured, whereas other blows to the head or body may not be forceful enough to trigger the alert, but result in a concussion.

Thus, the occurrence of “false-positive” results (sensor triggered without a concussion occurring) and “false-negative” results (sensor NOT triggered, but the athlete suffers a concussion) is of paramount concern to the SMAC. Additional concerns include athletes and parents denying that a concussion has occurred in the absence of the sensor being triggered and the prospect of competitive young athletes purposely attempting to trigger the sensor with forceful hits or blows during games and practices.

The NFHS SMAC stands by previous statements and publications regarding concussion in high school sports: prevention must focus on rules enforcement regarding helmet to helmet contact, and minimizing the cumulative effects of non-concussive blows to the head and body. ALL INDIVIDUALS involved in sports must be aware of the signs and symptoms of a possible concussion.

Officials and coaches, please note that the presence of a flashing light or other indicator on a helmet, head band, chin strap, or app shall NOT BE considered a “sign or symptom” of a possible concussion, as per the NFHS rules book, and should not be treated as such.

### **Sensors Designed to Detect Heat Illness**

Heat illness is the leading preventable cause of death in high school athletes. Exertional Heat Stroke (EHS) is defined by a body core temperature of greater than 104° F (40.0° C) and the presence of central nervous system dysfunction (confusion, delirium, seizures). Given that the rise in body core temperature is a key indicator of potential EHS, there is great interest in monitoring body temperature during conditions when the risk for exertional heat illness is believed to be elevated. Instruments measuring body temperature internally (such as a swallowed capsule with a temperature monitor and radio transmitter) and externally (a device attached to the skin or in a helmet with a temperature monitor and radio transmitter) are currently available.

The NFHS SMAC has serious concerns regarding the use of external heat sensors, due to inaccuracy in indicating core body temperature and the false assurance that these devices may give coaches and athletes. While internal temperature sensors are more accurate, they are expensive and require regular and frequent monitoring during practices and other activities. Until the use of external heat sensor technology has been proven to be valid under all conditions, the NFHS SMAC cannot endorse its use.

Following the recommended guidelines in the NFHS SMAC position statement “Heat Acclimatization and Heat Illness Prevention” and the on-line course “Heat Illness Prevention” can reduce the risk of exertional heat illness, incidence of EHS, and the resulting deaths and related injuries in high school athletics.

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#### **DISCLAIMER – NFHS Position Statements and Guidelines**

The NFHS regularly distributes position statements and guidelines to promote public awareness of certain health and safety-related issues. Such information is neither exhaustive nor necessarily applicable to all circumstances or individuals, and is no substitute for consultation with appropriate health-care professionals. Statutes, codes or environmental conditions may be relevant. NFHS position statements or guidelines should be considered in conjunction with other pertinent materials when taking action or planning care. The NFHS reserves the right to rescind or modify any such document at any time.