

# Interesting Articles for KEMA Members

systematic review

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**Using the Star Excursion Balance Test to Assess Dynamic Postural-Control Deficits and Outcomes in Lower Extremity Injury: A Literature and Systematic Review**

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**Context:** A dynamic postural-control task that has gained notoriety in the clinical and research settings is the Star Excursion Balance Test (SEBT). Researches have suggested that, with appropriate instructed and practice by the individual and normalization of the reaching distances, the SEBT can be used to provide objective measures to differentiate deficits and improvements in dynamic postural-control related to lower extremity injury and induced fatigue, as well as its potential to predict lower extremity injury. However, no one has reviewed this body of literature to determine the usefulness of the SEBT in clinical applications.

**Objective:** To provide a narrative review of the SEBT and its implementation and the known contributions to take performance and to systematically review the associated literature to address the SEBT's usefulness as a clinical tool and the quantification of dynamic postural-control deficits from lower extremity impairment.

**Data Sources:** Databases used to locate peer-reviewed articles published from 1980 and 2010 included Derwent Innovations Index, BIOSIS Previews, Journal Citation Reports, and MEDLINE.

**Study Selection:** The criteria for article selection were (1) The study was original research, (2) The study was written in English, (3) The SEBT was used as a measurement tool.

**Data Extraction:** Specific data extracted from the articles include the ability of the SEBT to differentiate pathologic influences of the lower extremity, the effects of external influences and interventions, and outcomes from exercise intervention and to predict lower extremity injury.

**Data Synthesis:** More than a decade of research findings has established a comprehensive portfolio of validity for the SEBT, and it should be considered a highly representative, noninstrumented dynamic balance test for physically active individuals. The SEBT has been shown to be a reliable measure and has validity as a dynamic test to predict risk of lower extremity injury, to identify dynamic balance deficits in patients with a history of lower extremity conditions, and to be responsive to training programs in both healthy people and people with injuries to the lower extremity. Clinicians and researchers should be confident in employing the SEBT as a lower extremity functional test.

**Key Words:** clinical balance, functional tests, dynamic balance tests, dynamic postural-control tasks

**Key Points**

- The Star Excursion Balance Test should be considered a highly representative noninstrumented dynamic balance test for physically active people.
- The Star Excursion Balance Test is a reliable measure and a valid dynamic test to predict risk of lower extremity injury, to identify dynamic balance deficits in patients with lower extremity conditions, and to be responsive to training programs in healthy participants and those with lower extremity conditions.

Clinicians often use postural-control assessments to evaluate risk of injury, initial deficits resulting from injury, and level of improvement after intervention for an injury. Postural-control and balance can be grouped into static and dynamic categories.<sup>1-6</sup> Static postural-control tasks require the individual to establish a stable base of support and maintain this position while minimizing segment and body movement during the assessment. These assessments can be conducted with noninstrumented equipment, such as a force platform, or valid, reliable clinical scales, such as the Balance Error Scoring System<sup>1-3,5,7-20</sup> or Berg Balance Scale.<sup>1,21</sup> Whereas static

measures of postural-control provide useful clinical information, the underlying task of standing as still as possible might not translate necessarily to movement tasks during physical activity.

Conversely, dynamic postural-control involves some level of expected movement around a base of support. This might involve tasks, such as jumping or hopping to a new location and immediately attempting to remain as motionless as possible or attempting to create purposeful segmental movements (reaching) without compromising the established base of support. Although these dynamic measures of postural stability do not exactly

하지 손상에서 동적 자세 조절 결손과  
(dynamic posture-control deficits)

결과(outcome)를 평가하기 위한

## “STAR EXCURSION BALANCE TEST”

# Using the Star Excursion Balance Test to Assess Dynamic Postural-Control Deficits and Outcomes in Lower Extremity Injury: A Literature and Systematic Review

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## 하지 손상에 대한 동적 자세 평가 하나로 끝내기!

### "star excursion balance test (SEBT)"

-여러분은 임상에서 하지의 자세 조절 능력(postural-control ability)을 평가하기 위해서 어떠한 도구를 사용하는가? 장비가 잘 갖추어진 병원 또는 시설이라면 자세 조절을 평가할 수 있는 장비가 구비되어 있을 것이고 (e.g. force plate), 그게 아니라면 간단한 도구(e.g. 균형 판, 토구, 쿠션 볼 등)를 이용할 것이다 (여기서 신경계 환자-뇌졸증, 파킨스 병 등-는 배제하기로 하자). 하지만 이러한 도구와 평가 방법으로는 점프, 흡평(hopping)과 같이 높은 활동력을 원하는 사람들에게는 제한점이 있다.

-여기서, KEMA research 강좌를 수강하신 분들이라면 이미 머릿속에 다른 방법을 떠올렸을 것이라는 생각이 든다. 바로 “Y-balance” 검사이다. 올해 research 코스에서 소개하였던 Y-balance 검사는 간편하게 하지의 자세 조절 능력을 평가할 수 있는 방법이다.

-지금부터 “Y-balance”검사가 비롯되어졌고, 도구 없이 바닥에서 쉽게 평가 할 수 있는 SEBT를 소개하려고 한다.



우리가 원하는 것

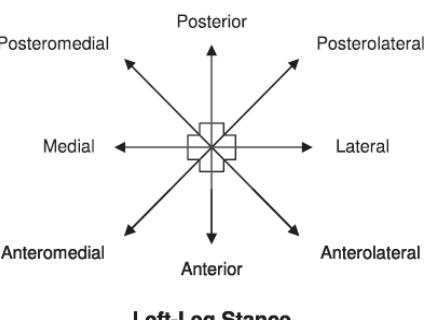
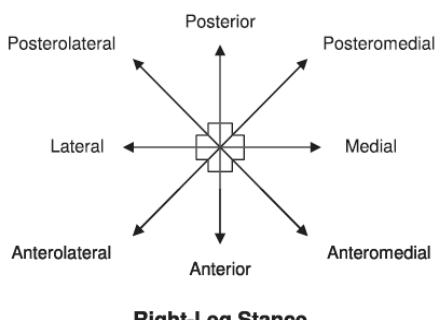


## Star excursion balance test ?

- 이 평가도구는 손상이 없는 측과 비교하여 손상 측의 균형능력을 평가하고 치료 전, 후 능력 향상도 반영할 수 있는 객관적인 도구이다.
- 이미 손상을 입은 사람뿐만 아니라, 손상이 없는 사람에게도 하지의 동적 자세 조절 능력을 평가하고 손상에 대한 위험도를 예측할 수 있다.
- 이전 문헌에서 평가도구에 대해 신뢰도가 검증 되었다(측정자간 ICC=0.81-0.93 , 측정자내 ICC =0.78-0.96).

### 어떻게 평가해야 되는가?

- 중심으로부터 45도씩 8방향으로 뻗어 있는 선을 이용한다 (아래 그림 참조).
- 여러 선이 교차하는 중심 위에 검사하려는 한쪽 다리를 올려 둔다.
- 화살표 방향과 같이 앞, 앞 안쪽, 앞 가쪽, 안쪽, 가쪽, 뒤쪽, 뒤 안쪽, 뒤 가쪽을 향해 지지하지 않은 다리를 이용하여 본인이 수행할 수 있는 최대로 다리를 뻗는다.
- 최대 도달된 범위는 다리길이에 대한 백분율 (%)로 표시한다.
- 최대 도달할 수 있는 범위가 얼마인가?



이 도구를 언제? 누구에게? 과연 검증은 되었는가?

## 1. 건강한 사람 vs. Pathologic condition을 가진 사람 구분하는 능력?

### → 검증됨 (15개의 논문)

- 1) 만성 발목 불안정 (Chronic ankle instability)
- 2) 전방 십자 인대 재건 (Anterior cruciate ligament reconstruction)
- 3) 대퇴슬개골 통증 증후군 (Patellofemoral pain syndrome)

## 2. 수행능력 (performance)에 미치는 요소를 구분하는 능력

### → 검증됨 (10개의 논문)

## 3. 중재(intervention)로부터 결과(outcome)증명하는 능력

### → 검증됨 (9개의 논문)

## 4. 손상에 대한 위험을 예측하는 능력 → 검증됨 (2개의 논문)

따라서, SEBT는 환자 또는 운동선수들의 반복적인 손상과 초기 손상에 대한 동적 자세 조절 능력 평가하고 일상생활 및 운동으로 복귀할 수 있는 평가 기준이 될 수 있다.

SEBT 도구는 빠른 시간 내에 간편하게 동적 자세 조절 능력을 평가할 수 있게 때문에 임상에서 유용하게 사용될 수 있다.

### “STAR EXCURSION BALANCE TEST”

는 도구가 없이도 동적 균형 능력을 평가 할 수 있는 믿을 수 있고(reliable), 타당(valid) 한 도구이다.

-KEMA 책임 연구원 김시현-

-문의사항은 KEMA 홈페이지 기사에 댓글로 남겨주세요-