Pilates to Improve Performance for a Professional Top Fuel Driver

Stephanie Fernandez
Course Date: March 2, 2013 – June 2, 2013
Location: California Pilates Center – Oceanside, CA
ABSTRACT

Athletes are not limited to those found on a football field or in a gym; they can also be found on a racetrack testing pushing their bodies to extremes while controlling up to 10,000 horsepowered machines traveling at speeds over 300 miles per hour. Brittany Force is classified as one of these incredible athletes, as one of the youngest drivers of a nitro-burning Top Fuel dragster, the fastest accelerating ground vehicle on the planet.

Through research and interviews we were able to understand what her body undergoes during a run down the racetrack and constructing a Pilates regime based on her athletic training to improve her performance behind the wheel.
Contents

ANATOMICAL BODY FOCUS ........................................................................................................... 4

INTRODUCTION .............................................................................................................................. 5

CASE STUDY ................................................................................................................................... 8

CONCLUSION .................................................................................................................................. 12

BIBLIOGRAPHY ............................................................................................................................... 13
ANATOMICAL BODY FOCUS

- **Shoulder Girdle:**
  The muscle groups in the shoulder girdle facilitate the movement of the glenohumeral joint, or the shoulders ball-and-socket joint allowing for a wide range of motion. As a muscle-dependent joint, the correct mechanics of shoulder strength requires a scapulohumeral rhythm designed to enable scapular stabilization, the rotator cuff and larger shoulder muscles.

- **Back Extensors**
  While operating congruent with the abdominals, diaphragm and pelvic floor to produce the ISS (Internal Support System), the opposing regions consist of layers of muscle groups. When focusing on strengthening of the spine the Multifidus is the primary focus to ensuring trunk stabilization.

- **Psoas**
  Comprised of the psoas major and psoas minor, the two connect with the iliacus to form the iliopsoas. The activation of the psoas muscles encourage hip flexion leading to proper spinal stabilization and alignment. The mind-body control needed to activate the psoas increase proper postural muscles.
INTRODUCTION

Since the creation of the automobile, our fascination of motor cars and the speed that goes with them has led to the birth of one of the most popular sports in the world, drag racing. The sport of drag racing was initially considered underground entertainment during the 1930s, taking place in remote locations from dry lake beds in the California deserts and vacant military runways. In 1951, the establishment of the National Hot Rod Association (NHRA) was created by Wally Parks and is now considered the largest sanctioning drag racing organization in the world. Over seventy-years later, the NHRA has pushed the boundaries of acceleration, running modified dragsters over 300 miles per hour! One of the newest pilots in the NHRA Mello Yello Drag Racing Series is Brittany Force, driver of the Castrol Edge Top Fuel Dragster. While the dragsters over 25-foot-long body reaches speeds over 300 MPH in under four seconds, the pilots of these machines are put through a series of physically demanding movements making it vital to have the proper muscle control to handle the 10,000 horsepowered machine down a racetrack.

At the age of 26, Brittany Force began her career as a professional Top Fuel driver competing at drag racings’ highest level traveling throughout the United States. As one of the only female drivers in the class, Brittany Force has over ten years of racing experience, and understands the importance of being in top physical condition when on the racetrack.

Despite the hectic 24-national event schedule, Brittany Force makes it a priority to maintain her current fitness routine of running at least two miles a week, while also including weekly practices of Bikrim yoga, Zumba and circuit training. Following my first client interview, Brittany Force is
incorporating Pilates training into her current regime to improve her strength and endurance while integrating the mind, body connection to improve body awareness while behind the wheel.

Looks can be deceiving when watching the drivers make their way down a grimy racetrack. At a second glance the chain of events is similar to an eloquently choreographed dance; beginning with her suiting-up in her firesuit and safety gear, to the hit of the throttle. Each movement and stage is vital to achieving a safe and successful pass; all similar to the formulated steps to the proper execution of any BASI exercise.

The cheers of the packed grandstands and the smell of nitro-methane fill the air as Brittany Force prepares for her first pass down the track. With the support of an eight-man crew, they all play an intricate role in the success and safety of completing the run. While in the staging lane awaiting their competition, Brittany Force is assisted in suiting-up in over ten-pounds of safety equipment including fire suit, helmet, HANS device (cervical and thoracic spine safety protection). Once properly fitted, Force climbs into the seat of the Top Fuel dragster. The required safety restraints cause the driver to position their body in a way that custom fits it to the cockpit. The result is slightly rounded shoulders while the arms are extended, shoulder distance apart, to reach for the steering grips; whereas the legs are extended to 90 degrees, with a slight bend reaching for the clutch and throttle (left foot on clutch, right on throttle). The final safety procedure is to secure the driver's head, placing extended pressure on the cervical spine as the chin is forced toward the chest.

Once at the starting line, Brittany strikes the throttle taking the dragster to the half-track marker for the burn-out. Intended to warm-up the tires, she uses both feet on the clutch and throttle independently moving the right and left foot in dorsi and plantar flexion. Once dragster and driver are ready for the run, the Top Fuel crew prepares to meet Force at the other end of the race track following
the pass. At the starting line, the amber bulbs flash, and Brittany’s body will experience 4Gs of force anteriorly while accelerating at over 160 miles per hour in just one second, reaching maximum speeds over 300 mile per hour. While piloting the dragster, Brittany is dependent on the shoulder girdle, and core to keep her stable, in order to control of the nitro-burning machine during the under four second pass. Once reaching the finish line and the parachutes are deployed, Brittany’s body experiences negative 6Gs of force posteriorly causing the cervical, thoracic and lumbar spine to undergo the first initial impact at the completion of the run. Reaching the end of the track, the right arm is fighting the acceleration to slow down the dragster while reaching the shut-off area.

It takes an incredible amount of strength to take on the responsibility of sitting in the cockpit of a Top Fuel dragster, and Brittany Force looks to further her performance and endurance by incorporating the BASI Pilates method into her physical training. During her 2013 rookie season, Brittany Force will have spent a total of nine hours and thirty-one minutes at accelerated speeds of over 300 MPH. The following conditioning program was designed for Top Fuel driver Brittany Force while incorporating the muscle focus necessary for her to progress to the overall goal of transforming her body into peak physical condition.
CASE STUDY

Name: Brittany Force

Age: 27

Limitations: The range of motion in the psoas has created restriction in the hip flexors, causing weakness in spinal stabilization.

Lifestyle: As a professional driver, propelling herself in a 10,000 horsepowered Top Fuel dragster has caused the body to undergo severe stress on the cervical, lumbar and thoracic spine.

Pilates Level: Intermediate, practicing primarily in mat and reformer repertoire.

BASI BLOCK SYSTEM

Warm Up: Mat
- Roll Down
- Pelvic Curl
- Spine Twist Supine
- Single Leg Lifts
- Leg Changes
  **TRANSITION: Roll Up**
In order to fully assess Brittany Force’s postural alignment before our session, I will begin with initiating her to begin three repetitions of the roll down. This will also give the client knowledge of her alignment while focusing on breath with the movement, transitioning to lying supine on the mat for a fundamental warm up.

Foot Work: Cadillac
- Parallel Heels
- Parallel Toes
- Open V-Heels
- Open V-Toes
- Calf-Raises
- Prances
- Single Leg Heel
- Single Leg Toes
- Hip Opener
The fundamental footwork block on the Cadillac was incorporated to focus on the strengthening of the hamstrings while strengthening the hip extensors. The pelvic lumbar stabilization on the Cadillac in the foot work block also establishes proper foot stabilizers and hip adductor control.

Full Body Integration I (F/I): Cadillac
(Push through Group)
- Sitting Forward
- Side Reach
- Cat Stretch Kneeling
Transitioning the client to a seated upright position for exercises in the Push Through Group focuses on the abdominal muscles and quadriceps. These exercises were chosen to complete the objective of spinal mobility and abdominal control, all focused on building strong back extensors.

Abdominal Work: Reformer
(Assist: 9” diameter ball above knees)
- Hundred Prep
- Hundred
The assist of this fundamental abdominal work incorporates hip adductor strength while focusing on abdominal strength and shoulder extensor control. Providing a deeper abdominal connection, the ball requires the client to stabilize legs in a table top position.

Hip Work: Reformer
- Frog
- Down Circles
- Up Circles
- Openings
- Extended Frog
The hip work on the reformer allows for proper pelvic lumbar stabilization while completing the objective of hip adductor strength.

Stretches: Reformer
Hamstring Stretch Group
- Standing lunge
Following abdominal and hip work on the reformer, the standing lunge stretch allows for a deep hip and hamstring stretch.
**Full Body Integration II:**
Client is not at level to perform Advanced or Master exercises.

**Arm Work: Avalon Step Barrel**
(Arm Sitting Series)
- Biceps
- Triceps
- Rhomboids
- Hug-a-Tree
- Salute

Performing arm work on the Avalon Step Barrel requires trunk stabilization while performing the series. Incorporating this arm work for my client will tailor to her specific athletic skill level of building shoulder and scapular stabilization.

**Spinal Articulation: Avalon Step Barrel**
- Roll Over

Following arm work on the Avalon Step Barrel, I wanted to transition into spinal articulation with the roll over. Focusing on the abdominal and hamstring control, the Avalon Step Barrel provides support on the thoracic and lumbar spine to properly complete the movement.

**Leg Work: Wunda Chair**
- Leg Press Standing

To incorporate balance and trunk stabilization, Leg Press Standing allows my client to focus on hip and knee extensor control while strengthening the hamstrings.

**Lateral Flexion/ Rotation: Wunda Chair**
- Side Stretch

Moving to the side of the Wunda Chair for side stretch, I like the trunk stabilization required during this movement. The strength building in the abdominals and obliques is amplified while controlling the pedal, but also offering a deep lateral flexor stretch.

**Back Extension: Ladder Barrel**
- Swan Prep

In completion of the block system, Swan Prep is a fundamental back extension exercise to complete my client’s session. Incorporating back extensor strength and trunk stabilization, the Ladder Barrel allows the lower extremities to be anchored for proper execution.
At the conclusion of our session, a final Roll Down will allow me to evaluate my client’s progression following the block system. This procedure will give the client a further stretch before returning to a proper Plum Line position.
CONCLUSION

The following case study is the basis of a strength training program based on athletic performance for professional Top Fuel driver, Brittany Force. The physical demand of driving one of a 10,000 horsepower machine requires Force to maintain and strengthen the shoulder girdle, back extensors, and psoas in order to improve the driver’s performance.

In continuing our sessions, I will utilize heightened resistance to better build Brittany’s strength and stamina. In a sport focused around vehicle performance, the drivers physical ability to control it typically go unnoticed, but Brittany Force has grown up in an industry built on adrenaline pumping moments and she understands the responsibility of safely performing her best each time she hits the throttle.
BIBLIOGRAPHY


