Testing, prescribing and monitoring training in team sports: The efficiency and versatility of the 30-15 Intermittent Fitness Test.

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Aim. The aim of this opinion piece is to highlight how these approaches can be imbedded within a high-performance program. Specifically, I'll aim to demonstrate how utilising the 30-15 Intermittent Fitness Test (Figure 1; see 30-15IFT.com for background information) can assist this process due to its versatility across performance strategies, providing examples of how this can be used for more than physical testing.

Background

To physically prepare athletes for team sport competition requires a fundamental understanding of the processes and outcomes of the training stimulus undertaken (2). Practitioners must correctly assess the training outcome (physical testing), manipulate training prescription (training process) and review the dose-response relationship (training monitoring) to optimise physiological adaptation and evaluate the program’s success. The interaction of these factors is inherently complex in team sports, due to multi-dimensional nature of training and divergent anatomical, physiological and functional responses to any given training stimulus across athletes (2). However, the conceptual framework (or feedback loop) to this complex problem is rather simple (see Figure 2).

For this feedback loop to run effectively, it is required that all three elements are simultaneously integrated and consistently revaluated. Whilst the success of this is determined from many factors (i.e. validity and reliability of tests and variables analysed, strategies developed to implement change, communication between staff etc.), the streamlining of data collected within these systems can assist in the integration of these elements. Put bluntly, being more efficient and versatile with less data can help simplify strategies and assist in decision making.

Discussion

The process of simplifying strategies and integrating any central parameter within a high-performance program, like everything else has merits and limitations. From my experiences using the 30-15IFT, this integration seemed rather organic in its progression. Importantly, it can deliver a clear rationale to why we test athletes and how we can provide meaningful changes within our program. Ultimately this is our aim, improve the quality of our program and provide strategies to create meaningful outcomes. I firmly believe that the best high-performance programs have this as a clear focus. It’s great collecting huge amounts of data from testing results and
monitoring systems, but if it’s not being used or doesn’t provide substantial upside, it’s probable you could live without it. By doing so you may even get better buy-in with the other systems you have in place. The reason for this is simple. Hopefully these ideas may generate some discussion on how you can better integrate the testing, prescription and monitoring systems within your program more effectively.

**Testing and Training Prescription.** When aiming to individualise the training process for athletes, it is important that the training outcome guides and reinforces the training process (prescription). (3) Despite this, there is currently a lot of commentary circulating that we are too time poor for testing. I do agree with this, to an extent. We are too time poor for testing without meaning. If you aren’t going to use your results to infer and drive your practice, stop. When done with purpose though, physical testing can provide more than just descriptive research. It can, and should, have a direct outcome or influence on your program. This creates ‘buy-in’ from players and coaches, through a transparent purpose. Ultimately, as physical performance coaches, we don’t win competitions – players do – but we can erode the foundations of performance with poor physical preparation. Therefore, preparing athletes to be able to complete tactical and technical drills at the intensities coaches want, whereby their fitness isn’t the limiting factor, should be our primary target. This is part of the reason I am a big advocate of the 30-15 IFT. From a testing tool, it is a great template to help build these responses across the squad. There has been much research(1, 9, 10) and ‘applied’ evidence (see Buchheit (11)) provided on the benefits and strategies of prescribing HIIT in team sports using the 30-15 IFT. However, much of this initial research has been developed in soccer or handball players, who typically present more homogenous physiological attributes than collision-based team sport athletes (e.g. rugby, American football). As such, when implementing these strategies, it is likely that heavier (mesomorphic) athletes may struggle with the set and rep schemes previously suggested (Figure 5). As a consequence, there is a need to extend these 30-15 IFT-based HIIT templates for collision-based team sports. Figure 6 presents an alternative strategy for these athletes. Despite employing typically shorter set durations, this template allows for the systematic progression of HIIT (and more intensive stimuli), whilst allowing athletes to better maintain targeted intensities (and hopefully) control running posture. Whilst this template shouldn’t be implemented in isolation, it does deliver a stream of conditioning that may target more specific physiological functions whilst maintaining a level of uniformity across a large squad. It also provides an ongoing assessment of the training outcome, allowing us to progress players on, or move to harder IFT groups if required. This imparts more versatility within the program.
The efficiency and versatility of the 30-15 Intermittent Fitness Test.

<table>
<thead>
<tr>
<th>Adapts</th>
<th>Running time</th>
<th>Running intensity (% VIFT)</th>
<th>Recovery duration</th>
<th>Recovery intensity (% VIFT)</th>
<th>Running Modality</th>
<th>Set length</th>
<th>Number of Sets</th>
<th>Recovery between Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>45 s</td>
<td>85-88%</td>
<td>15 s</td>
<td>Passive</td>
<td>Straight line</td>
<td>5 to 6</td>
<td>3'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 s</td>
<td>90%</td>
<td>15 s</td>
<td>Passive</td>
<td>Straight line</td>
<td>2 to 3</td>
<td>3'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 s</td>
<td>90%</td>
<td>30 s</td>
<td>40%</td>
<td>Shuttle 40m</td>
<td>2 to 3</td>
<td>3'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 s</td>
<td>100%</td>
<td>15 s</td>
<td>Passive</td>
<td>Shuttle 40m</td>
<td>2 to 3</td>
<td>3'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 s</td>
<td>95%</td>
<td>15 s</td>
<td>25%</td>
<td>Shuttle 40m</td>
<td>15'</td>
<td>3'</td>
<td></td>
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<tr>
<td>Peripheral</td>
<td>20 s</td>
<td>95%</td>
<td>20 s</td>
<td>Passive</td>
<td>Straight line</td>
<td>7-8'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
<tr>
<td></td>
<td>20 s</td>
<td>90%</td>
<td>20 s</td>
<td>45%</td>
<td>Shuttle 30m</td>
<td>7-8'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
<tr>
<td></td>
<td>15 s</td>
<td>95%</td>
<td>15 s</td>
<td>Passive</td>
<td>Shuttle 30m</td>
<td>7-8'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
<tr>
<td></td>
<td>15 s</td>
<td>95%</td>
<td>15 s</td>
<td>25%</td>
<td>Shuttle 40m</td>
<td>7-8'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
<tr>
<td></td>
<td>10 s</td>
<td>90%</td>
<td>10 s</td>
<td>Passive</td>
<td>Shuttle 10m</td>
<td>7'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
<tr>
<td></td>
<td>10 s</td>
<td>95%</td>
<td>10 s</td>
<td>Passive</td>
<td>Shuttle 40m</td>
<td>7'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
<tr>
<td></td>
<td>3 s</td>
<td>sprint</td>
<td>17 s</td>
<td>Passive</td>
<td>20m sprint or 2 x 10m shuttle</td>
<td>6'</td>
<td>2</td>
<td>6-7 active</td>
</tr>
</tbody>
</table>

Fig. 5. Original VIFT-based HIIT strategies developed by Buchheit(11)

![Training Monitoring.](image)

Training Monitoring. Training monitoring systems are established on our understanding of the relationship between the training process and training outcome. Once we feel comfortable that we have implemented some HIIT strategies that will progressively overload our athletes and induce positive adaptations, we are left with the million-dollar question. Is it working? Examining this training outcome and developing training monitoring systems can be achieved through many means, but our thinking should always be to first look at data currently collected. Indeed, much like prescribing training, training monitoring can be akin to opening Pandora’s box. And much like conditioning, we can get far too clever and complicated. For this example, I’ll demonstrate how the 30-15IFT can be used to better quantify the external load and evaluate athletes training status.

Whilst there are certainly benefits of utilising arbitrary speed thresholds to quantify external loads (individual and team longitudinal tracking, tactical performance metrics etc.) their physiological justification has been questioned.[12, 13] As such, relative speed thresholds expressed as an individual’s first (VT1IFT) and second (VT2IFT) ventilatory threshold have been proposed as more appropriate alternatives.[12, 13] However, undertaking laboratory testing to determine these thresholds is impractical in most team sports. An alternative method to this may be to use estimated first and secondary ventilatory thresholds derived from the 30-15IFT.[14] Recent internal research we’ve conducted demonstrates that these thresholds have a better relationship with measures of internal load, than that previously reported using comparative arbitrary velocities (from a meta-analysis; Figure 4).[15] As a result, we may get a more sensitive measure of external load through implementing thresholds we already have data for, providing a better understanding of the dose–response nature of training and competition.[16]

Once content with the derivation of the external training load, the next question is to make sense of the fitness and fa-

![Fig. 6. VIFT-based HIIT strategies for collision sport athletes.](image)
tigue conundrum. Figure 3, briefly displays how performance may be evaluated using the 30-15IFT, but we can also implement less invasive measures to assess changes in fitness or fatigue more regularly. Recently, methods such as the training efficiency index (TEI) have been proposed as an alternative to maximal tests to quantify how athletes are responding to training load without any testing, demonstrating positive results.[17] Submaximal exercise tests are another viable option for monitoring an athlete’s physiological capabilities and responses to training, providing an appropriate tool to monitor athletes training status.[18-20] In my opinion, standardising an external dose and investigating the internal response seems a logical way of identifying an athlete’s training status.[21] The issue with submaximal testing for mine, is it may be ill-directed or misunderstood. For example, what is our targeted submaximal load or response? Should we include an intermit-

tent or continuous stimulus? Does this need to be relevant to the sport and how do we standardise this for each athlete?

When aiming to implement any training status assessment with a squad of athletes possessing heterogenous physiological attributes, these questions maybe legitimate obstacles. An answer to this may be to simplify our process and individualise submaximal testing using data we already have. In this situation, the 30-15IFT can provide a standardised external dose across the squad (similar to HIIT) at submaximal intensities. From internal unpublished data, it appears using a 4-minute continuous submaximal shuttle test (12 x 20 second shuttles), prescribed at 60% \( V_{15IFT} \), may be an optimal load to answer many of these questions. Indeed, it appears more reliable than both a 12 km.h⁻¹ continuous run and Yo-Yo Intermittent Recovery Test Level 1 (both lasting 4 minutes). From this test, we can identify ‘true’ responses by accounting for both the change required to be considered substantial and the test TE (responder: change > nominated threshold and TE; see Figure 7) across varying heart rate variables. Importantly, from an applied perspective, monitoring this over the course of pre- and in-season we have been able to make actionable changes and infer levels of fatigue (Figure 8). Taken together, this analysis may provide another versatile avenue to use your 30-15IFT data, allowing more outcomes and insights to feed back into your high-performance framework.

Summary

It is vital within any high-performance program that we understand what our priorities are in order diminish inadequacies and implement meaningful changes. As such, improving the efficiency of your methods to test, prescribe and monitor training will likely help focus and direct performance strategies. For this reason, testing isn’t simply something done at the start and end of pre-season through a maximal physical test. It is something that can be done on-going (through the assessment of the training outcome) and should positively affect the outcomes to your program. A decision tree of sorts, allowing for adjustments to the training process. In the framework described above, the 30-15IFT is used as an example of how a central parameter can be used to implement greater homogeneity across large squads. However, we must understand the limitations of this process and where it fits in with the bigger picture. For example, whilst this allows for a more tailored conditioning program, I should mention, there are certainly times where a homogenous training outcome shouldn’t be a goal. After all, once you cross that white line everyone must get the job done. Further, HIIT and conditioning in general needs to be multi-dimensional, aiming to achieve not only physical but psychosocial adaptation too. Lastly, there are other methods (such as the TEI) that exist as promising alternatives to assess the training status of athletes. However, in the cost-benefit analysis washup I believe applying the versatility of the 30-15IFT across a performance program can allow for greater transparency, consistency and overall maintain some simplicity in your methods.

Acknowledgements. It would be remiss of me not to mention those people who have helped shape these philosophies and data presented. Those in the Brisbane Broncos performance team (Jeremy Hickmans, Ryan Whitey, Blake Duncan and Dave Ballard), my PhD supervisors (Grant Duthie, Ben Dascombe and Colin Sanctuary) who suggested and guided a lot of this research as well as Shaun McLaren for his help analysing much of our data.

Dataset

Dataset available on SportPerfSci.com
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