Tackle your Tics
a brief intensive tic training

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Treatment of tics

Environment external & internal

Brain/ physiology

Behaviour therapy:
Habit Reversal/CBIT & Exposure therapy

Medication
Deep brain stimulation
Botulinum toxin

Tics
Behavourial treatments - Negative Reinforcement

<table>
<thead>
<tr>
<th>STIMULUS</th>
<th>RESPONSE</th>
<th>CONSEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation</td>
<td>Tic</td>
<td>Relief</td>
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</tbody>
</table>

- Habit reversal training (HRT; Azrin & Nunn, 1973; CBIT; Piacentini, Woods ea, 2010):
  - Treats tics one by one
  - Awareness training
  - Competing response training
  - Change environmental factors

- Exposure and response prevention (ERP; Hoogduin ea, 1997; Verdellen ea, 2004):
  - Targets all tics at once
  - Resisting tics for a long period of time
  - Exposure to premonitory urges
Behaviour Therapy (HRT and ERP) is first-line intervention for tics

Apply medication if BT is not available or insufficient
### BT evidence: how good does it work? RCTs

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Age M (SD)</th>
<th>Condition</th>
<th>YGTSS (mean)</th>
<th>% improvement</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habit Reversal Training</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Wilhelm ea, 2003 HRT &gt; ST</td>
<td>32</td>
<td>36.2 (12.7)</td>
<td>HRT ST</td>
<td>30.5 26.6</td>
<td>35.1%</td>
<td>1.50</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19.8 26.9</td>
<td>-1.1%</td>
<td>0.03</td>
</tr>
<tr>
<td>Verdellen ea, 2004 HRT = ERP</td>
<td>43</td>
<td>20.6 (12.1)</td>
<td>HRT ERP</td>
<td>24.1 26.2</td>
<td>18.3%</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19.7 17.6</td>
<td>32.8%</td>
<td>1.42</td>
</tr>
<tr>
<td>Deckersbach ea, 2006 HRT &gt; ST</td>
<td>30</td>
<td>35.1 (12.2)</td>
<td>HRT ST</td>
<td>29.3 27.7</td>
<td>37.5%</td>
<td>1.06</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>18.3 26.8</td>
<td>3.2%</td>
<td>1.42</td>
</tr>
<tr>
<td>Piacentini ea, 2010 HRT &gt; ST</td>
<td>126</td>
<td>11.7 (2.3 )</td>
<td>HRT ST</td>
<td>24.7 24.6</td>
<td>30.8%</td>
<td>0.68</td>
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<td></td>
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<td></td>
<td></td>
<td>17.1 21.1</td>
<td>14.2%</td>
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<tr>
<td>Wilhelm ea, 2012 HRT &gt; ST</td>
<td>122</td>
<td>31.5 (13.7)</td>
<td>HRT ST</td>
<td>24.0 21.8</td>
<td>25.8%</td>
<td>0.57</td>
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<td></td>
<td></td>
<td>17.8 19.3</td>
<td>11.5%</td>
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</tr>
<tr>
<td>Yates ea, 2016 GRP HRT &gt; GRP PE</td>
<td>33</td>
<td>12.0 (1.38)</td>
<td>G HRT G PE</td>
<td>29.0 30.5</td>
<td>18%</td>
<td>0.39</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25.6 27.2</td>
<td>11%</td>
<td></td>
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<tr>
<td>Rizzo ea, 2018 BT &gt; PE</td>
<td>110</td>
<td>11.2 (2.43)</td>
<td>BT PE</td>
<td>19.7 21.9</td>
<td>37.5%</td>
<td>1.38</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MED</td>
<td>12.3 21.9</td>
<td>0%</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>14.7 14.7</td>
<td>39.0%</td>
<td></td>
</tr>
<tr>
<td>Nissen ea, 2018 GRP HRT/ERP = IND HRT/ERP</td>
<td>59</td>
<td>12.2 (2.32)</td>
<td>GRP IND</td>
<td>23.4 23.8</td>
<td>32.1%</td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IND</td>
<td>15.9 14.3</td>
<td>39.9%</td>
<td>1.21</td>
</tr>
</tbody>
</table>

**Notes:**
- **HRT, Habit Reversal Training**
- **ST, Supportive Therapy**
- **ERP, Exposure and Response prevention**
- **PE, Psycho-education**
- **BT, Behaviour Therapy**
- **MED, Medication**
- **G(RP), Group (Individual)**
2019 - Where do we stand?

A lot has been achieved!
- Efficacy of BT for tics is well established
- BT is first-line intervention for tics
- Availability of treatment manuals
- ‘Tics’ is available in 8 languages
- Trained therapists over Europe/US
- Remote delivery of treatment

Room for improvement:
- Enhance effects on tic reduction
- Improve Quality of Life
- Personalize treatments
- Find predictors of response to treatment
- Gain more insight in mechanisms of change
- Gain more insight in neurobiological correlates
- Still working on dissemination of BT
- Working on online accessibility of BT
Working Mechanisms? What do we know?

• Habituation? **Probably not**
  • Verdellen ea (2008): +
  • Specht ea (2013), Houghton ea (2017), vd Griendt ea (subm): -
  • Also supported by neurological findings that tic inhibition and premonitory urges are under control of two distinct neural pathways. Urges are not directly related to tic inhibition capacity (Ganos ea, 2012)

• Inhibitory learning / Cognitive change?
  • Based on the inhibitory learning model of extinction as a mechanism of exposure therapy for fear and anxiety (Craske ea, 2012, 2014)

• Other? Eg, increased inhibition ability?
  • EEG collected during neurocognitive task suggest that BT works by increasing the brains ability to inhibit movement (LaVoie et al., 2011)

Alternative models of therapeutic change warrant further investigation
Inhibitory Learning model of extinction

- Increasing the tic free period in the presence of the premonitory urge leads to a new ‘inhibitory’ response.

- The ‘tic’ response (in reaction to the urge) is still there, yet the ‘inhibitory’ response is stronger and more likely to win in a situation where both responses are possible.

- The learned association between the urge and following tic has become weaker as a result of the newly learned response.

Urge tolerance – degree to which tics are inhibited in presence of urges.
Expectancy disconfirmation

I cannot control my tics

I cannot stand the urge

I CAN control my tics

I CAN endure the urge
Reinforce urge tolerance: Optimizing Exposure

• Maintain focusing on the tic alarms/urges

• Provoke tic alarms:
  – Talking about tics and tic alarms
  – Describing tics and tic alarms
  – Taking a ”tic posture”, start the tic
  – Watching a video of someone doing tics
  – Therapist performs the tic
  – Imagining performing the tic
  – Imagine situations with many tics
  – Bring tic eliciting objects to sessions
  – Play games! Watch out: focus on the urges!

• Pay attention to generalization:
  – When able to suppress tics even with intense urges
  – Apply ERP in different situations, eg while reading, walking, calculating
  – From easy to more difficult situations

• Dense spacing of sessions

Video
Germain
Warming up
Training
Match
Score
The challenge

- optimizing ERP-therapy
- enhancing quality of life
- families needs & wishes
Training program

- 4-day intensive exposure
- Group format
- Supporting elements
- Patient participation
Design

Match

tic severity & urges (YGTSS, PUTS)

quality of life (C&A-GTS-QOL)

behavioral problems (CBCL)

treatment satisfaction
## Criteria

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
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</thead>
<tbody>
<tr>
<td>• youths aged 9 to 17 years</td>
<td>• behavioural treatment for tics in past year</td>
</tr>
<tr>
<td>• diagnosed with Tourette Syndrome or persistent (motor/vocal) tic disorder (DSM-5 criteria)</td>
<td>• pharmacological treatment, not stable the past 6 weeks or with planned changes during study</td>
</tr>
<tr>
<td>• moderate or severe tics (YGTSS total tic score &gt;13 (&gt;9 for children with motor or vocal tics only)</td>
<td>• poor mastery of the Dutch language</td>
</tr>
<tr>
<td>• comorbidities are allowed, unless the disorder requires immediate (change in) treatment</td>
<td>• IQ &lt; 75</td>
</tr>
<tr>
<td></td>
<td>• serious physical disease</td>
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<tr>
<td></td>
<td>• substance abuse, suicidality, psychotic disorders, severe ASD or ADHD-problems</td>
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<td>• poor group functioning</td>
</tr>
</tbody>
</table>
Conclusions

- feasible & satisfactory
- indications of effect on symptoms
- Further research (RCT) 2019-2023
The team

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