Movement as Part of your Migraine Treatment Plan

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What is in the realm of movement?

- Walking
- Running
- Yoga
- Stretching
- Spinning
- Dancing
Sedentary Lifestyle is Common in U.S.

Sedentary: 21 hours
- Sleeping
- Sitting at work
- Watching TV
- Leisure time
- On home computer
- Eating

Active/Standing: 3 hours
<table>
<thead>
<tr>
<th>Mitochondrial</th>
<th>Skeletal Muscle</th>
<th>Cardiac Muscle</th>
<th>Conduit Arteries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sedentary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ↑ mitochondrial DNA deletions and mutations&lt;sup&gt;71&lt;/sup&gt;</td>
<td>• ↑ IL-6 and CRP&lt;sup&gt;10&lt;/sup&gt;</td>
<td>• ↑ AGE accumulation indicative of collagen cross-linking&lt;sup&gt;57&lt;/sup&gt;</td>
<td>• ↑ sympathetic baroreflex sensitivity and ↑ sympathetic activation&lt;sup&gt;94&lt;/sup&gt;</td>
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<tr>
<td>• Electron transport chain abnormalities&lt;sup&gt;72&lt;/sup&gt;</td>
<td>• Activation of proteolytic systems&lt;sup&gt;81&lt;/sup&gt;</td>
<td>• ↑ Left ventricular stiffness&lt;sup&gt;98&lt;/sup&gt;</td>
<td>• ↑ sympathetic baroreflex sensitivity and ↑ sympathetic activation&lt;sup&gt;94&lt;/sup&gt;</td>
</tr>
<tr>
<td>• ↑ mitochondrial fission&lt;sup&gt;73&lt;/sup&gt;</td>
<td>• Inactivation of the PI3K/Akt/mTOR pathway&lt;sup&gt;12&lt;/sup&gt;</td>
<td>• ↑ β-adrenergic receptor desensitization resulting in impaired inotropic and chronotropic responses to adrenergic stimulation&lt;sup&gt;86&lt;/sup&gt;</td>
<td>• ↑ sympathetic baroreflex sensitivity and ↑ sympathetic activation&lt;sup&gt;94&lt;/sup&gt;</td>
</tr>
<tr>
<td>• ↓ mitochondrial content&lt;sup&gt;74&lt;/sup&gt;</td>
<td>• ↓ lean muscle mass&lt;sup&gt;53&lt;/sup&gt;</td>
<td>• ↓ SERCA2a contributes to prolonged calcium transients&lt;sup&gt;91&lt;/sup&gt;</td>
<td>• ↑ sympathetic baroreflex sensitivity and ↑ sympathetic activation&lt;sup&gt;94&lt;/sup&gt;</td>
</tr>
<tr>
<td>• ↓ respiration&lt;sup&gt;4&lt;/sup&gt;</td>
<td>• Greater proportion of hybrid fibers possibly due to dysregulation in MHC isoform expression&lt;sup&gt;84&lt;/sup&gt;</td>
<td></td>
<td>• ↑ sympathetic baroreflex sensitivity and ↑ sympathetic activation&lt;sup&gt;94&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• ↑ mitochondrial protein turnover through degradation of damaged proteins and de novo synthesis of new functional proteins&lt;sup&gt;75&lt;/sup&gt;</td>
<td>• ↑ metabolic enzymes profile: citrate synthase, β-HAD, glycogen phosphorylase&lt;sup&gt;85&lt;/sup&gt;</td>
<td>• ↓ SERCA2a mRNA &amp; protein expression&lt;sup&gt;90&lt;/sup&gt;</td>
<td>• ↑ expression of the transcription factor p53 which is associated with senescence compared to sedentary counterparts&lt;sup&gt;57&lt;/sup&gt;</td>
</tr>
<tr>
<td>• ↑ expression of PGC-1α&lt;sup&gt;76, 77&lt;/sup&gt;</td>
<td>• ↓ catabolic mRNA expression (FOXO3a, MuRF-1, Atrogin-1, myostatin)&lt;sup&gt;96&lt;/sup&gt;</td>
<td>• ↑ phosphorylation of threonine-17 residue of phospholamban allowing for faster reuptake of cytoplasmic calcium&lt;sup&gt;52&lt;/sup&gt;</td>
<td>• Lower markers of senescence (p21 and p16)&lt;sup&gt;97&lt;/sup&gt;</td>
</tr>
<tr>
<td>• ↑ SIRT3 content&lt;sup&gt;76&lt;/sup&gt;</td>
<td>• ↑ capillary-to-fiber ratio&lt;sup&gt;85&lt;/sup&gt;</td>
<td>• ↑ contractility and relaxation due to faster systolic rise and diastolic decay time of calcium&lt;sup&gt;93&lt;/sup&gt;</td>
<td>• ↓ expression of nitrotyrosine and NADPH oxidase (prooxidant)&lt;sup&gt;98&lt;/sup&gt;</td>
</tr>
<tr>
<td>• ↑ mitochondrial volume&lt;sup&gt;79&lt;/sup&gt;</td>
<td>• ↑ insulin sensitivity&lt;sup&gt;76&lt;/sup&gt;</td>
<td>• ↓ Left ventricular stiffness&lt;sup&gt;96&lt;/sup&gt;</td>
<td>• ↑ expression of manganese SOD (antioxidant)&lt;sup&gt;96&lt;/sup&gt;</td>
</tr>
</tbody>
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Endothelial cell
Smooth muscle cell

**Miles for Migraine**
Why does it matter?

• Correlation between low physical activity and migraine frequency (Koseoglu et al, 2015; Varkey et al, 2011)

• It might influence your brain (Koseoglu et al, 2015)
  - Decreasing stress reactivity
  - Improving sense of well-being
  - Changing sense of pain perception

• Reduction in migraine pain intensity, migraine days, and shorter duration of attack (Lemmens, 2019)
Increased Migraine Frequency

Happier Brain
What’s stopping you?

• Anxiety and fear surrounding migraine (Farris, 2019)

• 22–38% have subjectively reported at least one migraine triggered by exercise in their lifetime ➔ leaving exercise completely (Kelman, 2007)
ACSM recommendations: Average adult

AEROBIC EXERCISE
  • 150 minutes per week of *moderate* intensity exercise
  OR
  • 75 minutes per week of *vigorous* intensity exercise

STRENGTHENING
  • 2 days per week

STRETCHING
  • 2–3 days per week
What about for migraine?

AEROBIC EXERCISE
• 150 minutes per week of *moderate* intensity exercise
• 75 minutes per week of *vigorous* intensity exercise

STRENGTHENING
• 2 days per week

STRETCHING
• 2–3 days per week
**Aerobic exercise**

- Warm up and cool down

- Average adult recommendations: At least 10-minute intervals with goal of 150 minutes per week
  - People with migraine – 30 minutes 3x/week

- **Moderate intensity** instead of vigorous intensity
  - Submaximal intensity = 50-85% HR max
  - HR max calculation = 220 - age
Heart rate (HR) maximum calculation

• $220 - \text{age} = \text{HR Maximum}$

• Selen’s Age: 33 y/o

• Selen’s HR Maximum = $220 - 33 = 187$ beats per minute (bpm)

• $50-85\% = 93-159$ bpm
Assessing your own heart rate

• Place 2\textsuperscript{nd} and 3\textsuperscript{rd} digits over wrist or carotid artery in neck and assess for pulse (as shown in pictures below)

• Count how many beats you feel in a period of 30 seconds.
# Rating of Perceived Exertion (RPE) Scale

<table>
<thead>
<tr>
<th>Borg Scale 6-20</th>
<th>Intensity</th>
<th>Breathing Scale</th>
<th>Distance Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>No exertion at all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Extremely light</td>
<td>Can sing full songs</td>
<td>Could continue all day</td>
</tr>
<tr>
<td>8</td>
<td>Very light</td>
<td>Can sing partial verses</td>
<td>Could continue 4-6 hours</td>
</tr>
<tr>
<td>11</td>
<td>Light</td>
<td>Can talk in full sentences</td>
<td>Could continue 1-2 hours</td>
</tr>
<tr>
<td>12</td>
<td>Somewhat hard</td>
<td>Can talk in short sentences</td>
<td>Could continue 45-60 minutes</td>
</tr>
<tr>
<td>13</td>
<td>Hard (heavy)</td>
<td>Breathing hard, thinking clearly</td>
<td>Could continue 30-45 minutes</td>
</tr>
<tr>
<td>15</td>
<td>Extremely hard</td>
<td></td>
<td>Could continue 20-30 minutes</td>
</tr>
<tr>
<td>16</td>
<td>Maximal exertion</td>
<td></td>
<td>Could continue 15-20 minutes</td>
</tr>
</tbody>
</table>

Tips for starting a program

Example: Walking

• 5 minutes per day
• Increase by 5 minutes every week until you reach goal
• Increase intensity slightly every week

Start small: Short distance/duration

How to progress: Every 1-2 weeks

Progress duration first

Frequency: Depends on your symptoms

Don't forget the warm-up and cool down
POSTURE
Why Does it Matter?

• 80% of people with migraine had local tenderness in their neck and 50% of those had headache-like symptoms with palpation. (Luedtke, May, 2017)

• High prevalence of musculoskeletal dysfunction in people with migraine. (Luedtke, Starke, May, 2017)

• One study showed that people with migraine tended to have a straightening of their natural neck curvature. (Ferracini, 2017)
The amount of stress on your neck muscles changes based on your posture.
Posture: Pelvis positioning
Posture: Scapular stability
Posture: Neck positioning
Posture: At the computer

Wrist straight, hands at or below elbow level

Adjust chair height so knees are about level with hips
Head nod and chin tuck (Figure 1)

1. Start by lying face up with a small rolled towel under the upper part of your neck.
2. Gently nod your head. Nod your chin around an imaginary axis through your ears.

Hold for __________ seconds.
Repeat __________ times.
Yoga/Meditation
Why Does it Matter?

• Yoga has a positive impact on headache frequency, intensity, impact, and disability (Kumar, 2020)
• Meditation/mindfulness can help address rumination and pain catastrophizing (Wells, 2019)
• Mindfulness may promote nervous system recovery from a stressful event (Wells, 2019)
Yoga

• ”Union” – usually of the body and mind
• Originally used in preparation for meditation
Types of yoga

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<tbody>
<tr>
<td>Yin</td>
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<tr>
<td>Vinyasa</td>
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<tr>
<td>Bikram</td>
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<tr>
<td>Kundalini</td>
</tr>
<tr>
<td>Iyengar</td>
</tr>
<tr>
<td>Anusara</td>
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<tr>
<td>Hatha</td>
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<tr>
<td>Restorative</td>
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</table>
Yoga tips

• Work with and listen to your own body
• Modifications are allowed – always
• Do not quit
• Focus on your breathing
• Every day is different
Being Present

Mind Full, or Mindful?
Meditation
Being Present

- Focusing on the breath
- Lost in thoughts
- Caught myself thinking
  Back to the breath
- Thoughts again :(
  No progress in meditation!

MILES FOR MIGRANE
Being Present

Be the space between thoughts.
Time to Meditate
Review

• Aerobic exercise – move in some way every day!
  • Start small, working up to at least 30 minutes, 3 times per week with a long-term goal of 150 minutes of moderate intensity exercise per week.

• Posture
  • Focus on your day to day posture by working on pelvis position, setting up your work/computer environment, and practicing simple stretches and strengthening exercises.

• Yoga/meditation
  • Focus on being present, be kind to yourself when you lose focus or can’t perform a pose, start small
Questions & Discussion