TY 2.2-A The Cardiorespiratory System (Cardiac section)

Cardiovascular Physiology for Yoga Teachers

In exercise and fitness literature, you may come across terms that seem wholly unrelated to yoga.

However, understanding some basic cardiovascular physiology can help you:

- Structure classes to meet different goals and medical needs
- Adjust the intensity of classes for different populations
- Recognise when a class may be becoming more/less demanding than intended

Below are some of the key terms you may encounter.

Heart Rate

Heart rate is the number of times the heart beats per minute (bpm).

For the average adult resting heart rate is usually between 60–100 bpm. Although it can be lower in students with good cardiovascular fitness,

During exercise, heart rate increases to deliver more oxygen to working muscles.

Yoga is typically a low-to-moderate intensity activity. Whilst Gentle Hatha or restorative classes produce minimal increases, dynamic Vinyasa or Power styles may create moderate increases.

As a teacher, you can:

- Increase heart rate with flowing sequences, standing work and repeated transitions.
- Lower heart rate with slower pacing, forward folds and restorative practices

Be aware that students on beta blockers may show a blunted heart rate response. Anxiety, dehydration and fatigue also influence heart rate. Also, heated environments, such as a hot yoga class, will quickly raise heart rate.

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Stroke Volume (SV)

Stroke volume is the amount of blood pumped out of the heart with each beat.

It is measured in millilitres per beat.

With cardiovascular conditioning, stroke volume increases, meaning the heart pumps more efficiently.

While yoga is not typically high-intensity cardiovascular training, dynamic styles and practices such as repeated Surya Namaskara may:

- Improve venous return through muscular contraction
- Provide some cardiovascular conditioning over time (Bhavanani et all, 2011)
- Support more efficient circulation

Cardiac Output (Q)

Cardiac output is the total volume of blood pumped per minute. It is measured in litres per minute (L/min).

Cardiac Output = Heart Rate × Stroke Volume

At rest cardiac output for an average adult is usually around 5 L/min. During intense exercise this can increase to 15–25+ L/min.

Restorative classes should keep cardiac output close to resting levels.

Dynamic flow classes may moderately increase cardiac output. However, yoga typically remains submaximal compared to aerobic training.

In essence, yoga tends to train regulation and efficiency rather than maximal cardiac output.

As we age, cardiac output generally declines. Some older adults appear to compensate for this with increases in stroke volume (Fleg and Strait, 2015 and Houghton et al, 2016]. In essence declining cardiac output means a lower capacity to meet the physical demands of exercise (or daily life)/reduced exercise tolerance.

Oxygen Uptake (VO_2)

Oxygen uptake is the amount of oxygen the body uses during activity.

VO_2 max is the maximum oxygen an individual can use during intense exercise: a marker of aerobic fitness. From the age of 25 to 30 VO_2 max tends to decline on average at a rate of up to 10% per decade for those who are essentially sedentary. Some types of

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exercise can help to slow the rate of decline though (Hagberg, 1987 and Zoila et al, 2025).

Yoga does not typically produce large improvements in VO_2 max however it may help to mitigate decline in key ways (Hariprasad et al, 2024 and Barman, 2025). Breath-focused practices such as pranayama may:

- Improve breathing efficiency (Satheesh and Bindu, 2020)
- Strengthen respiratory muscles
- Increase awareness of the mechanics of breathing
- Improve tolerance to mild CO_2 build-up

In yoga, the emphasis is usually on quality, regulation and control of breath, rather than maximal oxygen demand.

Rate of Perceived Exertion (RPE)

This is a subjective scale measuring how hard exercise feels.

Perhaps the most common scale is 0–10 where:

- 0 = Rest
- 3–4 = Moderate effort
- 5–6 = Challenging but sustainable
- 7–8 = Hard
- 9–10 = Maximal

RPE is often more practical than heart rate in yoga settings.

In a restorative class you would be aiming for a RPE of 1 or 2. In a regular hatha class this may rise to 3 or 4 at certain points. In a Vinyasa or Power yoga class RPE may peak around 6 or 7, depending on the individual.

It can be useful to sometimes get feedback on RPE from students to know if you are pitching the class where you intended to and also to see if certain students are finding a class too hard or too easy. You need to factor in that some groups will perceive exertion differently to others. What may seem easy to you may be intensely challenging for some of your students, or vice versa.

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Target Heart Rate (THR) Zones

Target heart rate is often calculated as a percentage of maximum heart rate using the formula 220 – age. This can be a somewhat blunt calculation that doesn't account for the significant variety between individuals.

Nevertheless, an awareness of heart rate zones can be helpful when planning classes.

Heart Rate Zones

Zone	% Max HR	Training Effect	Yoga Application
Zone 1	50–60%	Active recovery and flexibility	Gentle to average hatha, restorative yoga
Zone 2	60–70%	Aerobic endurance and fat burning	Vinyasa, average to stronger hatha
Zone 3	70–80%	Cardiovascular fitness and strength	Low zone 3 may be possible in some strong flow / Power yoga
Zone 4–5	80–90%+	Anaerobic	Extremely unlikely in yoga

For yoga teachers, awareness of heart rate zones is useful to:

- Match class style to student goals
- Avoid unintentionally overloading beginners
- Understand fatigue levels
- Support appropriate pacing

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