A runner's heart

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Poet's note:
MBBS students are taught about the cardiovascular response to exercise during their classes on the cardiovascular system in Physiology. The topic helps to give them a bird's eye view of the integrative aspects of cardiovascular functions. The following poem is an attempt to aid understanding and recall by replacing a typical cognitive exercise with a catchy verse using a hypothetical athlete as an anchor.

'I want to run,' says the athlete.
'Wait a bit,' retorts his heart.
'I need to get ready for it.'

The sympathetic discharges,
and the athlete's heart races;
a stronger pump it has become.

It makes red elixir run
through arteries and veins,
which dilate as metabolites accumulate.

The blood rapidly darts
back to the heart;
aided by three efficient pumps.

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Skeletal, abdominal and thoracic:
while the first pump propels it,
the latter two pull it all in.

The toiling heart
demands more fuel,
so that it can fulfill its part.

The coronaries oblige,
as the elixir arrives,
with oxygen that the twin sacs provide.

This synchronized symphony,
this practiced drill,
is as necessary as it is beautiful.

If not for the cooperation
of the heart, lungs and vessels,
the athlete would be left far behind.

The following is a summary of the cardiovascular changes during exercise:

1. At the beginning of exercise, increased sympathetic activity causes tachycardia.

2. Increased ventricular contractility causes the heart to pump more blood. The cardiac output - the blood pumped out by the heart per minute - increases from 5L/min to 20-25L/min.

3. Due to release of vasodilator metabolites like adenosine, lactic acid, and CO_2, the blood vessels in the skeletal muscles dilate.

4. The venous return increases aided by the skeletal muscle, and abdominal and thoracic pumps.

5. The coronary circulation increases.
