The increase in VO2max with endurance training is due to both a ~50% increase in maximal cardiac output and a ~50% increase in maximal (a-v)O2 difference.

As maximal cardiac output = Heart Rate max x Stroke Volume max, a discussion of how training influences these two variables is appropriate. Training has no effect on maximal heart rate thus the entire increase in maximal cardiac output with endurance training is a result of an increase in maximal stroke volume. Mechanisms for the increase in maximal stroke volume include an increase in cardiac contractility (strength of contraction) and greater ventricular filling (increase in end diastolic volume).

The increase in maximal (a-v)O2 difference is due to three factors: an increase in red blood cell numbers (oxygen carrying capacity), an increase in muscle capillary density and local blood flow (oxygen delivery) and an increase in mitochondrial number (oxygen utilization).

Together, these training adaptations are responsible for the increase in VO2max associated with endurance training.