This review focuses on the suppression of physical performance in a cold environment and the underlying physiological mechanisms. There are many situations where humans have to perform physical activities in a cold environment. Cold environments often limit exercise and working performance by impairing functions such as force production, velocity, power and manual dexterity. A muscle temperature of around 27°C is assumed to be a critical temperature below which maximal voluntary isometric force starts to decrease. The endurance time of submaximal isometric contractions peak at muscle temperatures of 27 to 28°C and decrease rapidly above and below these temperatures. Dynamic exercise performance, especially fast velocity movement, is generally more disturbed by cooling than isometric contractions. Additionally, the effect of cold adaptation on exercise performance, and the potential related mechanisms are summarized here based on a limited number of studies. Since the involuntary muscle contraction of shivering disturbs fine motor control, habituation of shivering, which is an example of cold adaptation, potentially improves exercise performance. Higher hand skin temperatures, induced by greater cold induced vasodilatation after local cold adaptation, could improve manual dexterity. Since there have been few studies testing the effect of cold adaptation on exercise performance in a cold environment, further studies seem warranted.