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Removal of cellular waste from the extracellular space is fundamental for tissue health. Because the rate of material ejected by parenchymal cells varies across tissues, we searched for mechanisms that couple waste production and removal. Here, we show that the uptake of parenchyma-released mitochondria by macrophages is prominent across organs that rely on oxidative respiration-including heart, skeletal muscle, and brown adipose tissue-and that macrophage numbers closely align with the mitochondrial activity of each of these organs. We found that the mitochondrial activity of myofibers dictates the abundance of macrophages by modulating colony-stimulating factor 1 (CSF1) availability and the number of CSF1-producing fibroblasts in the tissue. Consequently, inhibition of CSF1-CSF1 receptor (CSF1R) signaling depleted macrophages and collapsed the mitochondrial activity of skeletal muscles. We propose that, by coupling macrophage abundance to the mitochondrial activity of their parenchyma, tissues ensure efficient waste disposal and fitness.