

Exercise Effect By Organ System

<i>Organ/System</i>	<i>Primary Physiologic Effect</i>	<i>Mechanism</i>	<i>Clinical Outcome</i>	<i>Programming Emphasis</i>
Skeletal Muscle	Improved glucose disposal	<ul style="list-style-type: none"> ↑ GLUT-4 translocation ↑ Insulin signaling sensitivity ↑ Mitochondrial density 	<ul style="list-style-type: none"> ↓ Fasting glucose ↓ Post-meal spikes ↓ A1C (0.5–1.0%) 	<ul style="list-style-type: none"> Aerobic + resistance training No long gaps between sessions
Liver	Improved fasting glucose regulation	<ul style="list-style-type: none"> ↓ Hepatic gluconeogenesis ↑ Hepatic insulin sensitivity ↓ Intrahepatic fat 	<ul style="list-style-type: none"> Lower fasting glucose Improved metabolic flexibility 	<ul style="list-style-type: none"> Consistent moderate-intensity aerobic Volume > sporadic intensity
Vasculature	Improved arterial compliance	<ul style="list-style-type: none"> ↑ Nitric oxide availability ↓ Sympathetic tone Improved endothelial function 	<ul style="list-style-type: none"> ↓ Systolic BP (5–8 mmHg) Reduced cardiovascular strain 	<ul style="list-style-type: none"> Regular moderate aerobic Avoid under-dosing intensity
Heart	Improved cardiac efficiency	<ul style="list-style-type: none"> ↑ Stroke volume Improved diastolic filling Lower resting heart rate 	<ul style="list-style-type: none"> ↑ VO₂ max ↓ Cardiovascular mortality risk 	<ul style="list-style-type: none"> Progressive aerobic conditioning Gradual overload
Brain	Improved mood regulation	<ul style="list-style-type: none"> ↑ BDNF Improved serotonin & dopamine signaling Better autonomic balance 	<ul style="list-style-type: none"> ↓ Depressive symptoms ↓ Anxiety Improved cognitive function 	<ul style="list-style-type: none"> Moderate intensity Consistency > intensity Avoid overtraining
Bone	Improved skeletal strength	<ul style="list-style-type: none"> Mechanical loading → ↑ Osteoblast activity Improved bone geometry 	<ul style="list-style-type: none"> Preserved or modest ↑ BMD Reduced fracture risk 	<ul style="list-style-type: none"> Progressive resistance Weight-bearing activity Balance training