Focused extracorporeal shockwave therapy (F-ESWT) is a **non-invasive treatment modality** with the strongest evidence supporting its use in **plantar fasciitis, calcific shoulder tendinitis, and knee osteoarthritis**, with emerging evidence in erectile dysfunction, low back pain, and cervical spondylosis. Benefits are **dose-dependent**, with higher-energy protocols generally producing superior outcomes.

Conditions with Strongest Evidence

Plantar fasciitis represents the best-supported indication. A pivotal FDA multicenter RCT (n = 246) demonstrated a **69.2% reduction in heel pain** with F-ESWT versus 34.5% with placebo (p = 0.0027), with success rates of 50–65%. High-quality evidence from systematic reviews confirms large effect sizes for both pain and function in chronic plantar fasciitis. Meta-analysis of foot and ankle studies showed a mean VAS difference of **−3.10 points** favoring ESWT over placebo/conservative treatment.

Calcific shoulder tendinitis is another well-established indication. A systematic review of 20 RCTs found that high-energy ESWT was significantly superior to placebo in decreasing pain, improving function (Constant-Murley score), and achieving **complete resorption of calcifications**. Piezoelectric focused generators have demonstrated calcification resorption rates of approximately **82.6%**. Importantly, ESWT shows no benefit over placebo in **non-calcific** rotator cuff disease.

Knee osteoarthritis has growing support. Meta-analyses demonstrate significant pain reduction at short, medium, and long-term follow-up compared to sham, with improvements in function at short-term. ESWT was also superior to corticosteroid and hyaluronic acid injections for both pain and function.

Conditions with Emerging

- **Lumbar facet joint pain:** A sham-controlled RCT (n = 128) showed a **64.4% VAS reduction at 12 months** with high-energy F-ESWT, with MRI-confirmed resolution of bone marrow edema in 58.8% of treated patients.
- **Cervical spondylosis:** A multicenter RCT (n = 320) demonstrated significantly improved VAS, NDI, ROM, and SF-36 scores versus sham, with an overall efficacy rate exceeding **90%**.

Mechanism of Action

F-ESWT works through **mechanotransduction** — converting acoustic energy into biological responses:

- **Neovascularization** via upregulation of VEGF, eNOS, and PCNA
- **Anti-inflammatory effects** through NO-mediated suppression of NF-κB
- **Tissue regeneration** via stem cell recruitment, tenocyte proliferation, and collagen synthesis
- **Pain relief** through decreased substance P, selective loss of unmyelinated nerve fibers, and serotonergic activation

Benefits are typically **gradual rather than immediate**, with main follow-up recommended no sooner than 4 months from baseline, as collagen turnover and remodeling require time.

Safety

F-ESWT has an excellent safety profile across all studied indications, with only minor adverse events such as temporary pain, swelling, or bruising reported.

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