

# Tissue Regeneration Factor

TRF 150™ and TRF 350™ – To support healthy bones and cartilage\*

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Tissue Regeneration Factor (TRF) is an ideal adjunct to the treatment of any stage of osteoporosis, broken or fractured bones, and for any condition in need of joint or cartilage repair.\* It is effective in helping to maintain joint homeostasis, the stable equilibrium of well-functioning components in a joint (such as the synovial membrane and cartilage matrix) without the presence of inflammation.<sup>1</sup> When joint homeostasis is disturbed, this equilibrium is affected and issues such as inflammation and various degenerative joint diseases can develop.

TRF works by addressing the pathways that cause the cartilage to degrade, as well as the ensuing pain and inflammation caused by arthritis and other degenerative joint conditions.\*<sup>2,3</sup> It is involved in the natural maintenance and repair of articular cartilage, which covers the surface of a joint where the ends of bones meet. When this cartilage becomes damaged, the bones will grind against each other instead of having a smooth, fluid movement. Since there is no direct blood supply to cartilage, damage to these areas from injuries, misuse, or overuse leads to pain and inflammation with potentially extended recovery time.

## What is Tissue Regeneration Factor?

TRF 150™ and TRF 350™ feature Cyplexinol® PRO, a bone-derived protein/collagen complex containing biologically active proteins known as Bone Morphogenetic Proteins (BMPs) as well as key growth factors naturally contained in bone, such as transforming growth factor-beta (TGF-β), insulin-like growth factor (IGF), platelet-derived growth factor (PDGF), and basic fibroblast growth factor (BFGF). TRF's Cyplexinol® PRO is derived from certified organic, bovine cortical bone. The BMPs in TRF 150™ and TRF 350™ are the components that activate the bone and cartilage-forming process, which is necessary for bone health and joint integrity and regeneration.<sup>4</sup> Research shows that BMPs are more effective when used in combination with growth factors such as IGF and TGF-β, which is present in TRF.<sup>5-8</sup> BMPs found in TRF are important morphogenic agents, as they play a role in the differentiation and growth of tissues during the body's development with multiple functions in regulating the development, homeostasis, and repair of various tissues.<sup>9</sup>

## TRF works in two ways:

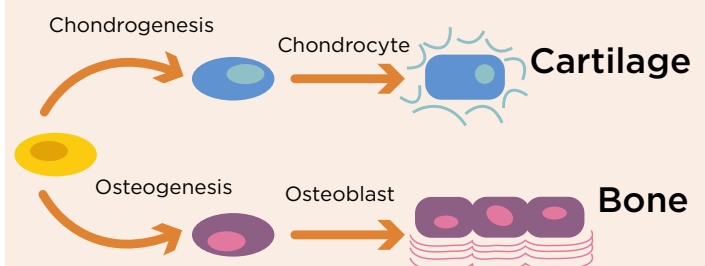
### 1. The Osteoinductive Effect

TRF is a bone anabolic agent (tissue regenerating), exerting its effect on bone by increasing bone formation and reducing bone resorption.\*<sup>10</sup> It is actually the bone morphogenetic proteins that are osteoinductive, as they stimulate mesenchymal stem cells and differentiate them into osteoblasts (produce bone tissue) and chondrocytes (produce cartilage).<sup>11,12</sup> Oral supplementation of TRF has been shown to have a direct effect on bone metabolism, affecting the protein collagen complex found in TRF and biomarkers such as bone collagen, bone hydroxyproline (an amino acid that occurs in collagen and other connective tissue proteins), and bone protein synthesis.<sup>13</sup> The results of a case series show that daily Cyplexinol® supplementation for two to five years significantly increased bone mineral density scores between 18.5% and 63%, which was enough to move the subject from an osteoporotic diagnosis to osteopenic.<sup>14</sup>

### TRF may help benefit\*:

- Osteoarthritis<sup>3,22</sup>
- Osteopenia
- Rheumatoid arthritis<sup>3,22</sup>
- Broken/fractured bones
- Athletes
- Joint pain and inflammation caused by overuse or injury<sup>23</sup>
- Articular cartilage abnormalities due to cellular senescence & the natural aging process<sup>24</sup>

## Mesenchymal Stem Cells



**TRF 150™****2. Supporting a normal inflammatory response and healthy immune system\***

Bone morphogenetic proteins have an immunosupportive effect by exhibiting antagonist activity towards key pro-inflammatory cytokines (such as IL-1 and IL-6) and transcription factors, all of which are responsible for inflammation.<sup>5,12,15</sup> IL-1 activates NF-κβ transcription factor and matrix metalloproteinases (a group of zinc-dependent enzymes that can break down proteins such as extracellular matrix proteins). Thus, BMPs work to suppress major inflammatory cytokines, leading to the restoration of joint and cartilage homeostasis.<sup>12,16</sup> In a clinical trial on Cyplexinol® PRO, its osteoinductive proteins have been reported to yield a significant improvement in the reduction of joint pain and frequency of pain with an increase in activity level and joint strength in those with osteoarthritis.<sup>17</sup>

**TRF and Osteoporosis**

Bone loss during aging and in post-menopausal women results from an imbalance between bone formation and resorption, which leads to an alteration in bone architecture and various degrees of bone fragility.<sup>18</sup> Loss of bone strength and an increased number of bone fractures in patients with osteoporosis may be associated with a decreased capacity for bone regeneration, which is related to the lower content of BMPs and growth factors in the bone's matrix. Since TRF is considered a bone anabolic agent, it may play an integral role in helping to decrease the progression and symptoms of osteoporosis.<sup>10,19,20</sup> Research shows that BMPs improve bone mineral density even in ovariectomized rats, where ovaries have been surgically removed and bones lack BMPs.<sup>12</sup> Improvements were seen in trabecular (spongy) bone architecture, trabecular thickness, and trabecular connectivity.<sup>21</sup>

**Supplement Facts**

Serving Size 1 capsule

Amount Per Serving	% Daily Value
Cyplexinol® PRO (partially hydrolyzed collagen and its associated proteins including Bone Morphogenetic Proteins [BMPs])	150 mg *

\*Daily Value not established.

**Other Ingredients:** Cellulose (capsule), microcrystalline cellulose, vegetable stearate.**TRF 350™****Supplement Facts**

Serving Size 1 capsule

Amount Per Serving	% Daily Value
Cyplexinol® PRO (partially hydrolyzed collagen and its associated proteins including Bone Morphogenetic Proteins [BMPs])	350 mg *

\*Daily Value not established.

**Other Ingredients:** Cellulose (capsule), microcrystalline cellulose, vegetable stearate.**Recommended Use:** Take one capsule per day with a meal, or as directed by your health care practitioner.

*For additional bone and joint support, consider pairing TRF 150™ or TRF 350™ with OsteoForce™, Osteoben®, or ArthroSoothe™.*

*For a list of references cited in this document, please visit:*

<https://catalog.designsforhealth.com/assets/itemresources/trf-references.PDF>

Dosing recommendations are given for typical use based on an average 150 pound healthy adult. Health care practitioners are encouraged to use clinical judgement with case-specific dosing based on intended goals, subject body weight, medical history, and concomitant medication and supplement usage.

Cyplexinol® PRO is a registered trademark of ZyCal Bioceuticals, Inc

**\*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.**

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