

Regulating Bone Metabolism

The RANK/sRANKL/OPG System

Bone metabolism is a continual, cyclic interplay of bone growth and resorption that is carefully orchestrated by the dynamic relationship between osteoclasts, osteoblasts and an array of hormonal and regulatory influences. The relative levels of these signaling molecules dictate whether healthy, balanced bone metabolism ensues. One of the regulatory systems used to keep bone metabolism balanced is the RANKL/RANK/OPG system^{1,2}.

Disturbances to delicate RANKL/OPG equilibrium where resorption is greater than growth can weaken the skeletal architecture and put one at risk for the development of chronic and debilitating bone diseases.

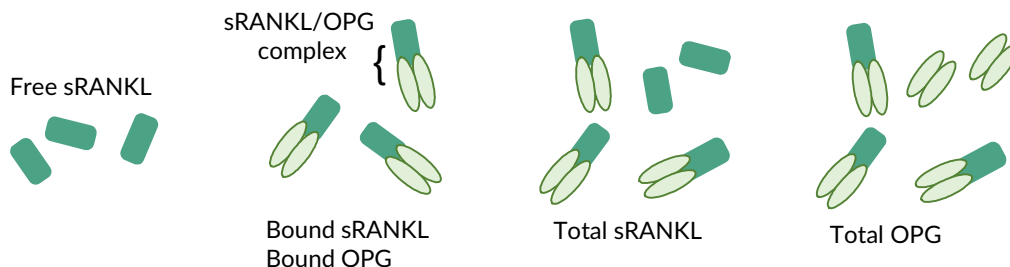
Measuring OPG and sRANKL can support research of the following diseases and disorders²:

- Osteoporosis
- Paget's disease
- Periodontal disease
- Rheumatoid arthritis
- Cherubism
- Expansile skeletal hyperphosphatasia

The RANK/sRANKL/OPG System

Understanding the Difference Between Free vs. Bound vs. Total Levels of sRANKL and OPG

The components in the RANKL/RANK/OPG system may be free or bound to a receptor or binding protein. As a result there are multiple approaches to measuring the system:



The Role of the sRANKL/OPG Ratio

Since the RANKL/RANK/OPG system assists with the regulation of bone metabolism, the ratio of sRANKL to OPG is considered important in understanding bone mass and strength³. Measuring the changes in the ratio of total sRANKL/OPG have been shown to be useful in researching the pathologies of several disease states such as ankylosing spondylitis⁴, multiple myeloma bone disease⁵, systemic sclerosis⁶, and knee osteoarthritis⁷.

Catalog Number	Description	Measures	Sensitivity	Range	Sample Size	Sample Type
30-1016	Total sRANKL	Free soluble RANKL + OPG bound soluble RANKL*	0.0156 ng/mL	0.0156–300 ng/mL	10 µL	Cell culture, plasma, serum
04-BI-20462	Ultrasensitive free sRANKL	Free soluble RANKL (not bound to OPG)	0.2 pg/mL	1.25-40 pg/mL	150 µL	Heparin plasma, serum
30-1019	Mouse/rat sRANKL	Total sRANKL (free + OPG bound)	0.0625 ng/mL	0.0625–40 ng/mL	100 µL	Cell culture, serum, urine
04-BI-20403	Osteoprotegerin ELISA (OPG ELISA)	Total OPG (free OPG + bound OPG)	1.4 pg/mL	25-400 pg/mL	20 µL	Citrate plasma, EDTA plasma, heparin plasma, serum
30-1020	Mouse/rat OPG ELISA	Total OPG (free + sRANKL bound)	0.0625 ng/mL	0.0625–40 ng/mL	100 µL	Cell culture, plasma, serum, urine

*Can be used to measure separate values for bound sRANKL and free sRANKL. Contact ALPCO for alternate protocol.

References:

- Walsh and Choi (2014). Biology of the RANKL-RANK-GOP system in immunity, bone, and beyond. *Front Immunol.* 2014 Oct 20;5:511. PMID: 25368616
- Khosla (2001). Minireview: The OPG/RANKL/RANK System. *Endocrinology.* 2001 Dec;142(12):5050-5. PMID: 11713196
- Boyce and Xing (2007). Biology of RANK, RANKL, and osteoprotegerin. *Arthritis Res Ther.* 2007; 9(Suppl 1): S1. PMID: 17634140
- Kim, et al (2005). Elevated serum levels of soluble receptor activator of nuclear factors-κB ligand (sRANKL) and reduced bone mineral density in patients with ankylosing spondylitis (AS). *Rheumatology* (2006) 45 (10): 1197-1200. doi: 10.1093/rheumatology/kei072
- DR Xu, et al (2010). Significance of sRANKL/OPG ratio in diagnosis of multiple myeloma bone disease. *Zhongguo Shi Yan Xue Ye Xue Za Zhi.* 2010 Apr;18(2):376-80. PMID: 20416172
- Dovio, et al (2008). Circulating Osteoprotegerin and Soluble RANK Ligand in Systemic Sclerosis. *J Rheumatol.* 2008 Nov;35(11):2206-13. PMID: 18843778
- Pilichou, et al (2003). High levels of synovial fluid osteoprotegerin (OPG) and increased serum ratio of receptor activator of nuclear factor-κB ligand (RANKL) to OPG correlate with disease severity in patients with primary knee osteoarthritis. *Clin Biochem.* Jun 2008; 41(9): 746-9. PMID: 18355453

For Research Use Only.

800-592-5726 | www.alpco.com