Comparison of Sensipar® to Vitamin D Analogs and Phosphate Binders

End Stage Renal Disease (ESRD) results in a deficiency of biologically active Vitamin D. Clinical sequelae of this deficiency include low calcium levels, high phosphorus levels and high levels of a hormone produced by the parathyroid gland (PTH). This response by the parathyroid glands is called secondary hyperparathyroidism (HPT). Several types of medications may be used for the manifestations of secondary HPT, but these medications are in different drug classes, have different clinical effects, and are not equivalent.

To treat secondary HPT, most patients are prescribed a combination of medications from the classes shown in the table below. These types of medication are complementary and not equivalent or interchangeable. However, some are advocating that oral drugs with no intravenous (IV) equivalents that are used to treat the manifestations of secondary HPT, specifically calcimimetics and phosphate binders, should be included in the new bundled payment system for dialysis facilities as substitutes or "equivalents" for IV Vitamin D.

It would be clinically inappropriate for calcimimetics or phosphate binders to be treated as interchangeable substitutes to Vitamin D analogs or considered equivalents to Vitamin D analogs given the numerous differences between the drugs shown in the table below, including their active ingredients and their opposite effects on calcium and phosphorus levels. While a calcimimetic can treat some of the manifestations of secondary HPT, it cannot by definition, treat Vitamin D deficiency, i.e., low calcium levels, and cannot be considered a substitute for or equivalent to Vitamin D.

	Calcimimetics (Sensipar®)	**Vitamin D Analogs**	**Phosphate Binders**
Current Medicare Benefit	▪ Never Part B Covered by all Part D Plans	▪ Separately billable under Part B (IV formulation)	▪ Never Part B ▪ Covered by Part D
Delivery[1]	▪ Oral ▪ Daily with a meal (therefore cannot be with dialysis)	▪ IV (most usage in dialysis) and oral ▪ 3x per week with dialysis (most usage in ESRD) or daily	▪ Oral ▪ Several times a day with meals (therefore cannot be with dialysis)
FDA-approved Indications[2]	▪ Secondary HPT in patients with chronic kidney disease on dialysis ▪ Hypercalcemia in patients with parathyroid carcinoma	▪ Secondary HPT in patients with chronic kidney disease on dialysis ▪ Secondary HPT in patients with chronic kidney disease stages 3-4 ▪ Hypocalcemia in chronic kidney disease on dialysis ▪ Hypocalcemia in post-surgical, idiopathic, and pseudo HPT	▪ Control of serum phosphorus in patients with chronic kidney disease on dialysis ▪ Hyperphosphatemia in ESRD and does not promote aluminum absorption
Impact on Lab	▪ PTH: Decrease	▪ PTH: Decrease	▪ PTH: Decrease

[1] Adapted from prescribing information for Sensipar® (cinacalcet), Zemplar® (paricalcitol), Hectorol® (doxercalciferol), Renagel® (sevelamer hydrochloride), Renvela® (sevelamer carbonate), Fosrenol® (lanthanum carbonate), PhosLo® (calcium acetate), Rocaltol® (calcitriol). Sensipar® is a registered trademark of Amgen; all other trademarks are the property of their respective owners.

	Calcimimetics (Sensipar®)	Vitamin D Analogs	Phosphate Binders
Values[2] • *Parathyroid Hormone (PTH)* • *Calcium (Ca)* • *Phosphorous (P)* • *Calcium Times Phosphorous (Ca x P)*	▪ Ca: Decrease ▪ P: Decrease ▪ Ca x P: Decrease	▪ Ca: Increase ▪ P: Increase ▪ Ca x P: Increase	▪ Ca[3]: Varies ▪ P: Decrease ▪ Ca x P: Varies
Mechanism of Action[2]	▪ Directly lowers PTH by increasing the sensitivity of calcium receptors on the gland to extracellular calcium	▪ Controls absorption and re-absorption of calcium from the gut, and reduces PTH by mobilization of calcium stores	▪ Binds phosphate in dietary tract decreasing absorption which has an indirect effect on lowering PTH
Rate of use by patients with secondary HPT[4]	▪ 27% ▪ 81% of patients using calcimimetics also are on Vitamin D analog	▪ 77%	▪ 77%

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2 de Francisco ALM. *Expert Opin Pharmacother*. 2006;7:2215-2224. National Kidney Foundation. *Am J Kidney Disease*. 2003;42(suppl 3)S1-S201. Goodman WG. *Kidney Int*. 2001;59:1187-1201. Goodman WG. *Semin Dial*. 2004:17:209-216.

3 The effect of phosphate binders on calcium levels varies, in particular calcium-based phosphate binders can increase calcium levels. This in turn also impacts the calcium x phosphorous levels.

4 DOPPS III (cross sectional analysis of sample of prevalent patient in U.S., 2008).