OI Type Chart

Hundreds of mutations involving more than a dozen genes have been associated with OI. Currently, there are several systems for addressing the clinical and genetic variability of OI. Some focus on clinical severity as the overriding measure while others focus on specific gene causes to distinguish types. Others integrate both. Broadly speaking, based on severity of the clinical picture, OI can be grouped into four classes – mild, moderate, severe, and extremely severe or lethal. The great majority of OI cases (85-90%) are inherited in an autosomal dominant manner where gene mutations affect the quantity or quality of type I collagen. These cases are described in Types I-IV on this chart. Genotype/phenotype relationships have not been clearly established for either dominant or recessive OI and knowing the OI type is not predictive of future function. Knowledge of the mutation provides useful information for genetic counseling. Knowledge of the Type or degree of severity can help establish an initial treatment plan.

The following chart is a genetic classification system that includes a description of severity. Additional clinical features are included at www.oif.org/informationcenter.

Nosology of Osteogenesis Imperfecta[1]

OI TYPE	INHERITANCE	PHENOTYPE	GENE DEFECT
Defects in collagen synthesis, structure, or processing			
I	AD	Mild	Null COL1A1 Allele
II	AD	Lethal	COL1A1 or COL1A2
III	AD	Progressive Deforming	COL1A1 or COL1A2
IV	AD	Moderate	COL1A1 or COL1A2
XIII	AR	Mild/Severe	BMP1
Defects in bone mineralization			
V	AR	Variable, Distinctive Histology	IFITM5
VI	AR	Moderate/Severe	SERPINF1
Defects in collagen modification			
VII	AR	Severe (Hypomorphic)	CRTAP
VIII	AR	Severe/Lethal	LEPRE1
IX	AR	Moderate/Lethal	PPIB
XIV	AR	Severe	TMEM38B
Defects in collagen folding and cross-linking			
X	AR	Severe/Lethal	SERPINH1
XI/BRKS1	AR	Mild/Severe	FKBP10
BRKS2	AR	Moderate/Severe	PLOD2
Defects in osteoblast development with collagen insufficiency			
XII	AR	Severe	SP7
XV	AR	Severe	WNT1
XVI	AR	Severe	CREB3L1
XVII	AR	Progressive Severe	SPARC
XVIII	XR	Moderate/Severe	MBTPS2

AD = autosomal dominant; the mutation is inherited in a dominant manner
AR = autosomal recessive; the mutation is inherited in a recessive manner

References

[1] Marini JC, Forlino A, Bächinger HP, Bishop NJ, Byers PH, Paepe A, Fassier F, Fratzl-Zelman N, Kozloff KM, Krakow D, Montpetit K, Semler O. Osteogenesis imperfecta. Nat Rev Dis Primers. 2017 Aug 18;3:17052. doi: 10.1038/nrdp.2017.52. PMID: 28820180.