

# Transient Streaming Potential Coupled with Piezoelectric Effect in Bone Tissue

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## ABSTRACT

Bone plays a role to constructively support human body and protect organs. And the Bone is continuously changes based on the mechanoelectric biosignal occurred by external mechanical stimulus. When the bone experiences deformations, the origin of this transduction can be sought from electric characteristics (piezoelectricity) of bone solid and existence of electrolytic interstitial bone fluid (streaming potential). Previous study of the transduction effects on the bone have been separately studied in two categories as the piezoelectricity and the streaming potential. However, it could be assumed that two phenomena are closely related based on the electrokinetic point of view. In this study, a new transient streaming potential equation was proposed and solved to connect the piezoelectricity to the streaming potential in bone. A new transient streaming potential equation was included transient velocity and charge density of bone fluid. The streaming potential equation in the steady state has been used for bone. The results could explain the electroviscous effects on the longer relaxation time from observations than that from predictions based on the previous equation.

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