

## Mechanisms of Endosseous Integration

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**Purpose:** Although the clinical term osseointegration describes the anchorage of endosseous implants to withstand functional loading, it provides no insight into the mechanisms of bony healing around such implants. Nevertheless, an understanding of the sequence of bone healing events around endosseous implants is believed to be critical in developing biologic design criteria for implant surfaces. **Results and Discussion:** This discussion paper shows that peri-implant bone healing, which results in contact osteogenesis (bone growth on the implant surface), can be addressed experimentally. The first, osteoconduction, relies on the migration of differentiating osteogenic cells to the implant surface, through a temporary connective tissue scaffold. Anchorage of this scaffold to the implant surface is a function of implant surface design. The second, de novo bone formation, results in a mineralized interfacial matrix, equivalent to that seen in cement lines in natural bone tissue, being laid down on the implant surface. Implant surface topography will determine if the interfacial bone formed is bonded to the implant. A third tissue response, that of bone remodeling, will also, at discrete sites, create a bone-implant interface comprising de novo bone formation. **Conclusion:** Treatment outcomes in dental implantology will be critically dependent on implant surface designs that optimize the biologic response during each of these three distinct integration mechanisms. *INT J PROSTHODONT* 1998;11(5):391–401.