















## 5. Conclusion

PVD method can be considered as a suitable method for obtaining nano-feature morphology and statically significant high removal torque mean value. We hypothesize that rapid bone formation in response to the combination treated nano-Ti dental implants are dependent on better biocompatibility of the material and on surface topography, which greatly affects the histological and biomechanical properties of the interface.

## References

- [1] Brama M, Rhodes N, Hunt J, Ricci A, Teghil R, Migliaccio S, et al.. Effect of titanium carbide coating on the osseointegration response in vitro and in vivo. *Biomaterials* 2007; 28,595-608.
- [2] Rosa AL, De Oliveira CS, Beloti MM, Xavier SP, De Oliveira PT. Effect of microcapsules containing TAK-778 on bone formation around osseointegrated implants: histomorphometric analysis in dogs. *Implant Dent* 2006; 15, 97-103.
- [3] Klokkevold PR, Nishimura RD, Adachi M, Caputo A. Osseointegration enhanced by chemical etching of the titanium surface. A torque removal study in the rabbits. *Clin Oral Implants Res* 1997; 8,442-447.
- [4] Takebe J, Ito S, Champagne CM, Cooper LF, Ishibashi K. Anodic oxidation and hydrothermal treatment of commercially pure titanium surfaces increases expression of bone morphogenetic protein-2 in the adherent macrophage cell line J774A. *J Biomed Mater Res A* 2007; 80,711-718.
- [5] Keller JC, Draughn RA, Wrightman JP, Dougherty WJ, Meletiou SD. Characterization of sterilized CP titanium implant surfaces. *Int J Oral Maxillofac Implants* 1990; 5,360-369.
- [6] Ogawa T., Saruwatari L., Takeuchi K., Aita H., Ohno N., Ti nanonodular structureing for bone integration and regeneration *Dent. Res* 2008; 87(8), 751-756.
- [7] Großner-Schreiber B., Herzog M., Hedderich J., Duck A., Hannig M. and Griepentrog M., *Clin. Oral Implants Res* 2006;17, 736.
- [8] Hacking S. A., Zuraw M., Harvey E. J., Tanzer M., Krygier J. J., Boby J. D., A physical vapor deposition method for controlled evaluation of biological response to biomaterial chemistry and topography, *Biomed. Mater. Res. A* 2007; 82, 179-187.
- [9] Koontz CS, Ramp WK, Peindl RD, Kaysinger KK, Harrow ME. Comparison of growth and metabolism of avian osteoblasts on polished disks versus thin films of titanium alloy 1998; 42(2), 238-44.
- [10] Kaiyong Cai, Michael Muller, Jorg Bossert, Annett Rechtenbach, Klaus D. Jandt. surface structure and composition of flat titanium thin film as a function of film thickness and evaporation rate; *Applied Surface Sciene* 2005; 250, 252-267.
- [11] Kim E.S., Park E.J., Choung P.H. Platelet concentration and its effect on bone formation in calvarial defects: An experimental study in rabbits: *J Prosth Dent* 2001; 86, 428-33.
- [12] Dahlin C, Sennerby L, Lenkholm U, Linde A, Nyman S. Generation of New Bone around Titanium Implant using membrane technique: An experimental study in rabbits. *Int J Oral Maxillofac Implant* 1989; 4 (1), 19-25.
- [13] Friberg B, Jemt T, Lekholm U. Early failures in 4,641 consecutively placed Brånemark dental implants: a study from stage 1 surgery to the connection of completed prostheses. *Int J Oral Maxillofac Implants* 1991; 6, 142-146.
- [14] Atsumi M, park S, wang H. Methods used to Assess implant stability: Current status. *Int J Oral Maxillofac Implant* 2007; 22, 743-754.
- [15] Mano T, Ueyama Y, Ishikawa K, Matsumura T, Suzuki K. Initial tissue response to a titanium implant coated with apatite at room temperature using a blast coating method. *Biomaterials* 2002; 23, 1931-36.
- [16] Variola F.; Yi, J.H.; Richert, L.; Wuest, J.D.; Rosei, F.; Nanci, A. Tailoring the surface properties of Ti6Al4V by controlled chemical oxidation. *Biomaterials* 2008; 29: 1285-1298
- [17] Sean S. Kohles, Melissa B. Clark, Christopher A. Brown, James N. Kennedy, Direct assessment of profilometric roughness variability from typical implant surface types, *The int J of oral & Maxil Implants* 2004 ;19(4), :510 – 516.
- [18] He J, Zhou W, Zhou X, Zhong X, Zhang X, Wan P, Zhu B, Chen W. The anatase phase of nanotopography titania plays an important role on osteoblast cell morphology and proliferation. *J Mater Sci Mater Med* 2008; 19(11), 3465-72.
- [19] Sul, Y.T.; Johansson, C.; Wennerberg, A.; Cho, L.R.; Chang, B.S. & Albrektsson, T. Optimum surface properties of oxidized implants for reinforcement of osseointegration: surface chemistry, oxide thickness, porosity, roughness, and crystal structure. *The International Journal of Oral and Maxillofacial Implants* 2005; 20(3), 349-359.