ENHANCING AND ACCELERATING BONE GROWTH

INTRODUCING HYDROPHILICITY TO YOUR IMPLANT

Aim

To achieve reduced healing time and faster osseointegration for implants, a reactive response from surrounding cells and tissue must be induced to assure cellular adhesion to the implant. Surface roughness and hydrophilicity both play key roles with respect to this process. For porous devices, hydrophilicity is necessary to induce the adsorption of bodily fluids into small pores and cavities of the structure.

The aim of this study was to evaluate the hydrophilicity of HA_{nano} Surface modified and unmodified titanium discs over 12 months. To evaluate hydrophilicity, the contact angle between the implant surface and a liquid is measured. Depending on the contact angle, a surface can be classified as either hydrophilic or hydrophobic. A solid surface is considered hydrophilic when the contact angle is less than 90˚.

Materials and Methods

The hydrophilicity of unmodified titanium discs and discs modified with HA_{nano} Surface was evaluated with deionized water as the liquid media. The static contact angle (i.e. the angle where the interface of a water droplet meets the surface of the disc) was measured. The presented results represent an average of five measurements.

Results and Discussion

The results from the measurements show that an HA_{nano} Surface modified surface is significantly more hydrophilic than unmodified titanium (Figure1). The contact angle for HA_{nano} Surface modified discs is below 10° for the first two months, after that it increases to stabilize around 20-25° after approx. three months. The unmodified titanium surface changes in the same way, which indicates that the increase in contact angle probably is due to impurities from the air attaching to the surface. Thus, the increase in contact angle can most likely be avoided when the implants are stored in a commercial packaging.

Conclusion

From static contact angle measurements, it has been shown that the degree of hydrophilicity is strongly enhanced with HA_{nano} Surface compared to unmodified titanium surfaces (Figure 2). This indicates that presence of HA_{nano} Surface may promote adhesion and growth of bone cells to greater extent than unmodified titanium.

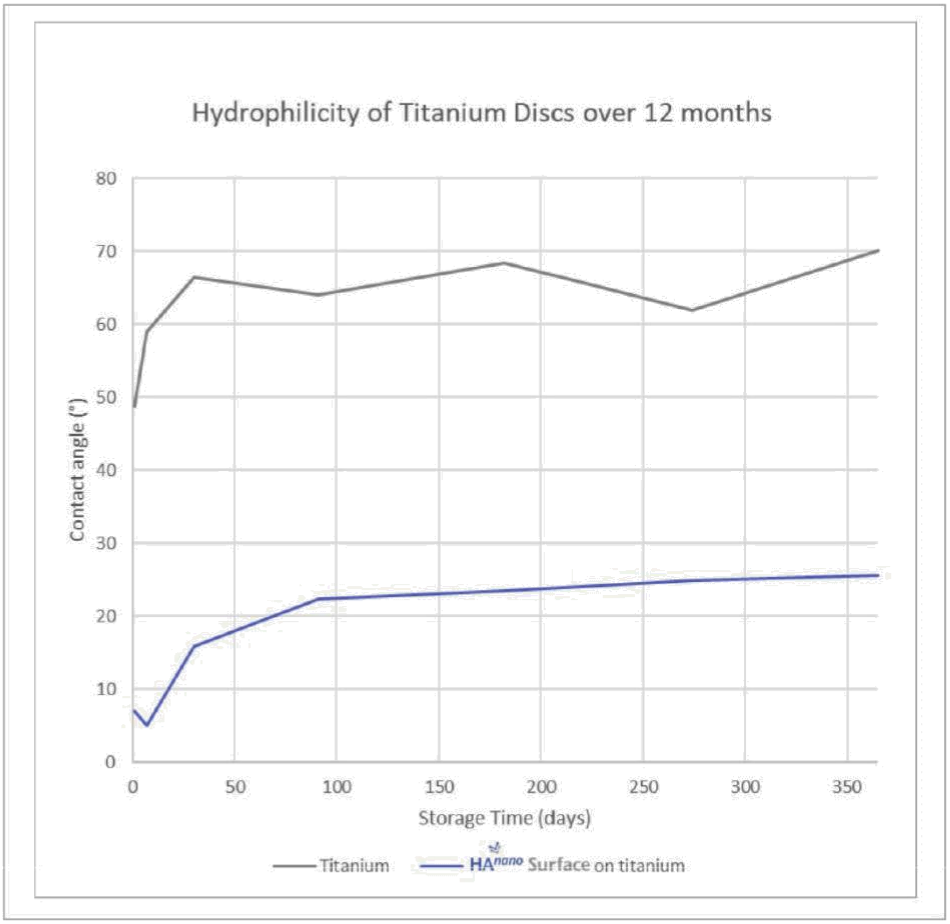

Figure 1. HA$_{nano}$ Surface modified titanium surfaces are significantly more hydrophilic than unmodified titanium. Results are expected to improve even more with optimized storage conditions.

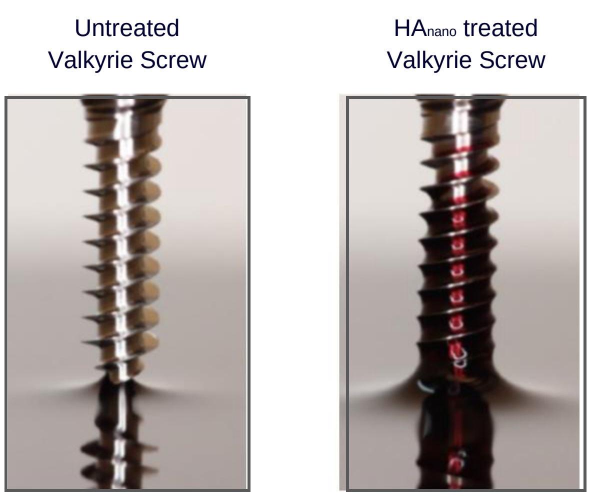

Figure 2. The degree of hydrophillitcy is greatly enhanced with the HA$_{nano}$ surface comapred to an unmodified titanium surface, allowing for facilitaded absorbution of body fluids into small pores and cavities on the implant surface.

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