Aim: The surface of dental implants determines the initial phases of the biological response and affects its ability to integrate into the surrounding tissue. Covalently binding a monolayer of phosphorous rich molecules (SurfLink) to well established surface modifications (sandblasting, acid-etching) offers new dimensions of osseointegration. The aim of this study is to present the surface analysis of SurfLink implants using Scanning Electron Microscopy (SEM) and elemental analysis (EDX).

Material and Methods: Machined and roughened dental implants with either SurfLink treatment or no treatment (control) were placed in the pelvis of 24 sheep. Selected implants, retrieved after 52 weeks healing, previously used for removal torque testing, were analyzed by SEM and EDX (Phenom ProX SEM, high-sensitivity backscattered electron detector for topographical mode and thermoelectrically cooled Silicon Drift Detector for EDX).

Results: SurfLink implants showed increased bone coverage on the machined and roughened surfaces compared to control implants. The presence of mineralized fibrous structures was evidenced by significant Ca and P peaks detected by EDX, with bone cells on the SurfLink implant surface. The machined control implant showed a nearly bare titanium surface. Fracture lines after torque testing occurred at the bone-implant interface in the control group, while the SurfLink implants showed a fracture line within the bone, indicating the absence of the typical proteoglycan layer.

Conclusion: SEM images of SurfLink implants showed fractures within the bone and not at the bone-implant interface. This suggests a significant increase in bone adhesion on SurfLink surfaces. Clinically this results in improved implant stability especially in the early phases of osseointegration.
1. Implant
2. Bone
3. Fracture line - implant-bone interface
4. Fracture line - within the bone