

## READER'S FORUM

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### Changes in surface roughness of bracket and wire after experimental sliding - preliminary study using an atomic force microscopy.

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**Q1.** In Figure 3, four wings of brackets were grinded using a dental high-speed handpiece and a chamfer bur so that the probe of atomic force microscopy could approach to the surface of bracket base. Then, it is possible that, during grinding the wings, the debris of the wings may attach to the slot surface to influence the surface roughness. How did you treat the brackets to prevent or reduce it?

**Q2.** Wires were slid through the brackets at the speed of 23 mm/min by an electronic motor. How did you select the sliding velocity?

**Q3.** I feel that the coefficient of friction is one of the key factors regarding friction. Were there any consideration for this factor?

*Questioned by*

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**A1.** To remove the wing debris, each bracket was dried using an air syringe for 5 seconds, rubbed with an alcohol swab for 5 times, immersed in alcohol solution for 5 seconds, and then dried again using an air syringe for 10 seconds. After this process, the brackets were examined

under an optical microscope to confirm there were no debris remaining on the bracket slots before atomic force microscopy.

**A2.** It is very difficult to reproduce the actual sliding velocity in the lab environment. Furthermore, there is no standard available in the literature yet concerning the sliding velocity used under the condition similar to our experiment. The sliding velocity of this study was randomly selected with reference to current *in-vitro* studies.

**A3.** Authors strongly agree that consideration for the coefficient of friction is mandatory. However, this is a preliminary study and its significance lies in the fact that it is an investigation to test the validity of atomic force microscopy for the purpose of quantitatively analyzing the surface roughness of the brackets and wires. In the future, we plan to investigate the coefficient of friction with lateral force microscopy, which is another kind of atomic force microscopy. While only two kinds of brackets were used in this study, further studies were already performed with various kinds of brackets including self-ligating brackets.

*Replied by*

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