Title:

Er:YAG laser irradiation enhances bacterial and lipopolysaccharide clearance and human gingival fibroblast adhesion on titanium discs

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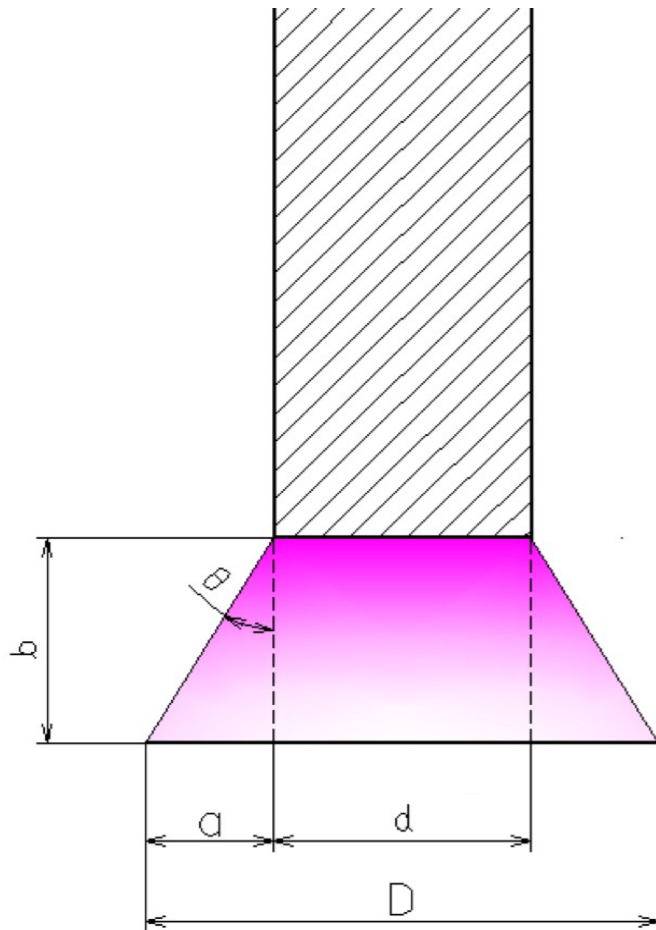
b= distance from tip end
d= diameter of the fiber core
θ= beam divergence
D= diameter of the fiber varied by distance b
S= Irradiation area

$D = d + 2a = d + 2b\tan\theta$
$S = \pi \times D^2/4 = \pi \times (d + 2b\tan\theta)^2/4$
Radiant exposure＝Radiant energy x Tip transmittance/ Irradiation area(S)

b=0 mm, d=0.6mm, θ=5.2, D=0.78 mm, S=0.28 mm^2
Radiant exposure = 80mJ X 0.62 / 0.28mm^2 =177.14 mJ/mm^2 =17.714 J/cm^2

In our study:
b=1 mm, d=0.6mm, θ=5.2, D=0.78 mm, S=0.48 mm^2
Radiant exposure = 80mJ x 0.62 / 0.48mm^2 =103.33 mJ/mm^2 =10.333 J/cm^2

The declined rate is 10.333 / 17.714=0.5833

Considering the titanium surface (7.5 mm x 7.5 mm x 3.14=176.625 mm^2) and irradiation time (600 seconds)
The total radiant exposure is
80 mJ/pulse x 0.62 x 25 pulse/sec x 600 sec x 0.5833 / 176.625 mm2= 2457 mJ/mm^2=245.7 J/cm^2