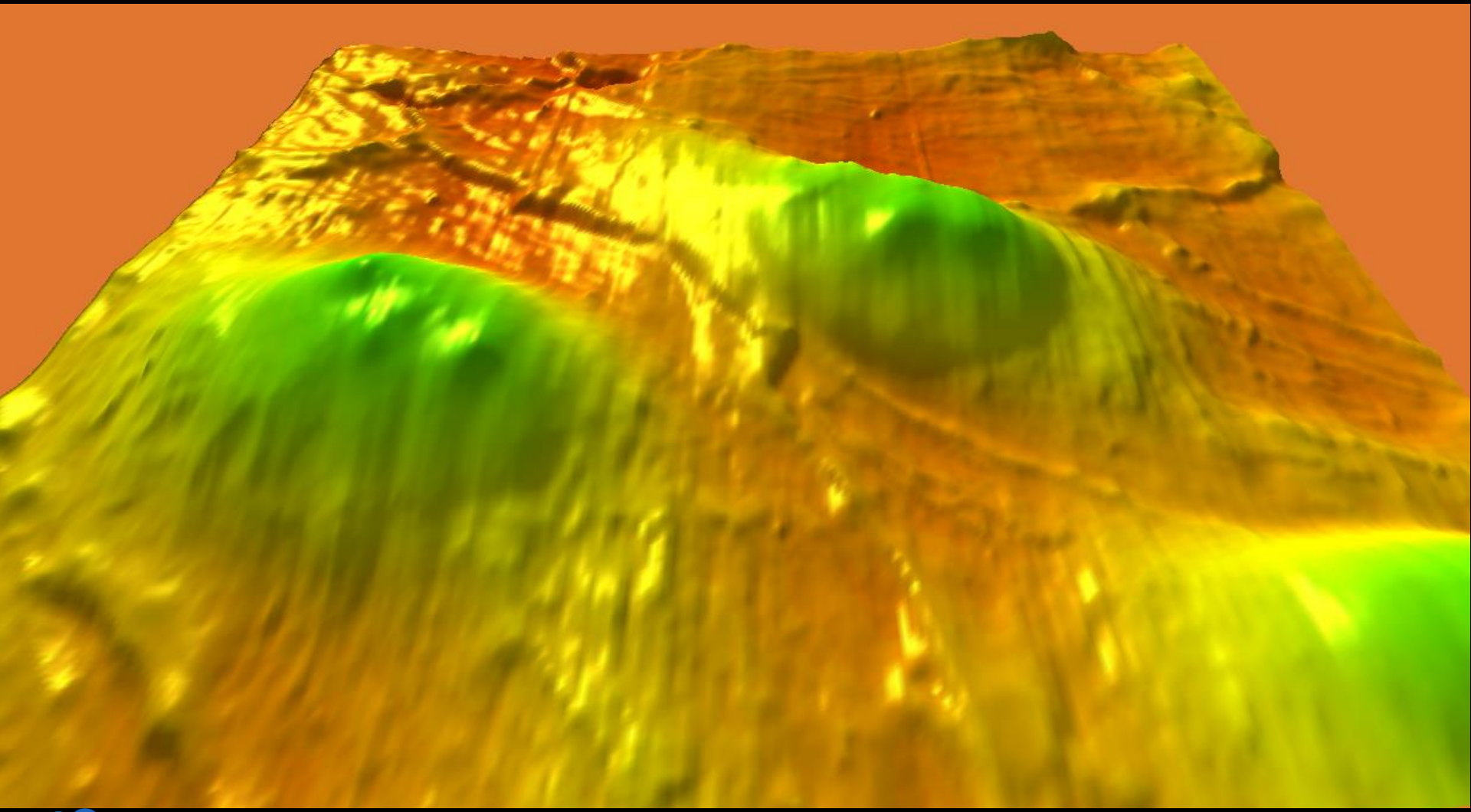
Membrane tethers reshape intercellular de-adhesion dynamics



Attila-Gergely Végh
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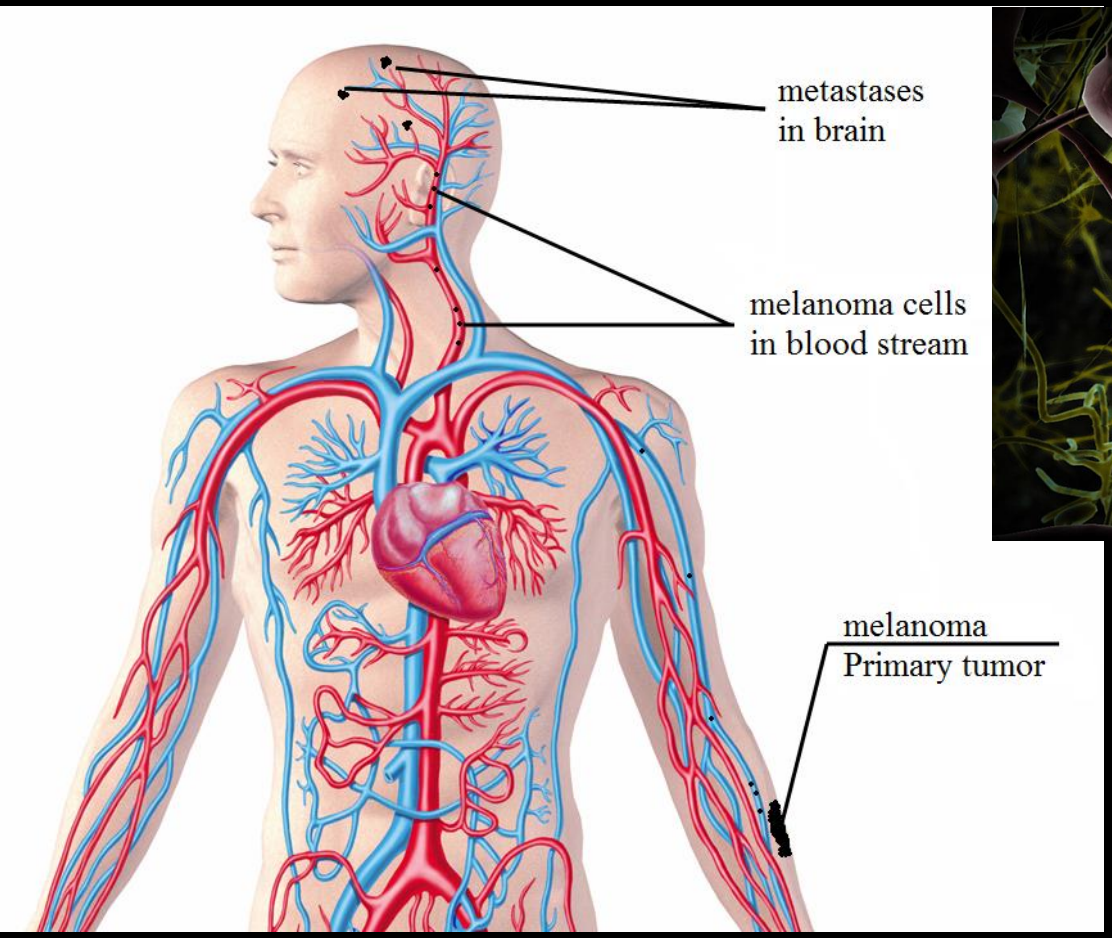
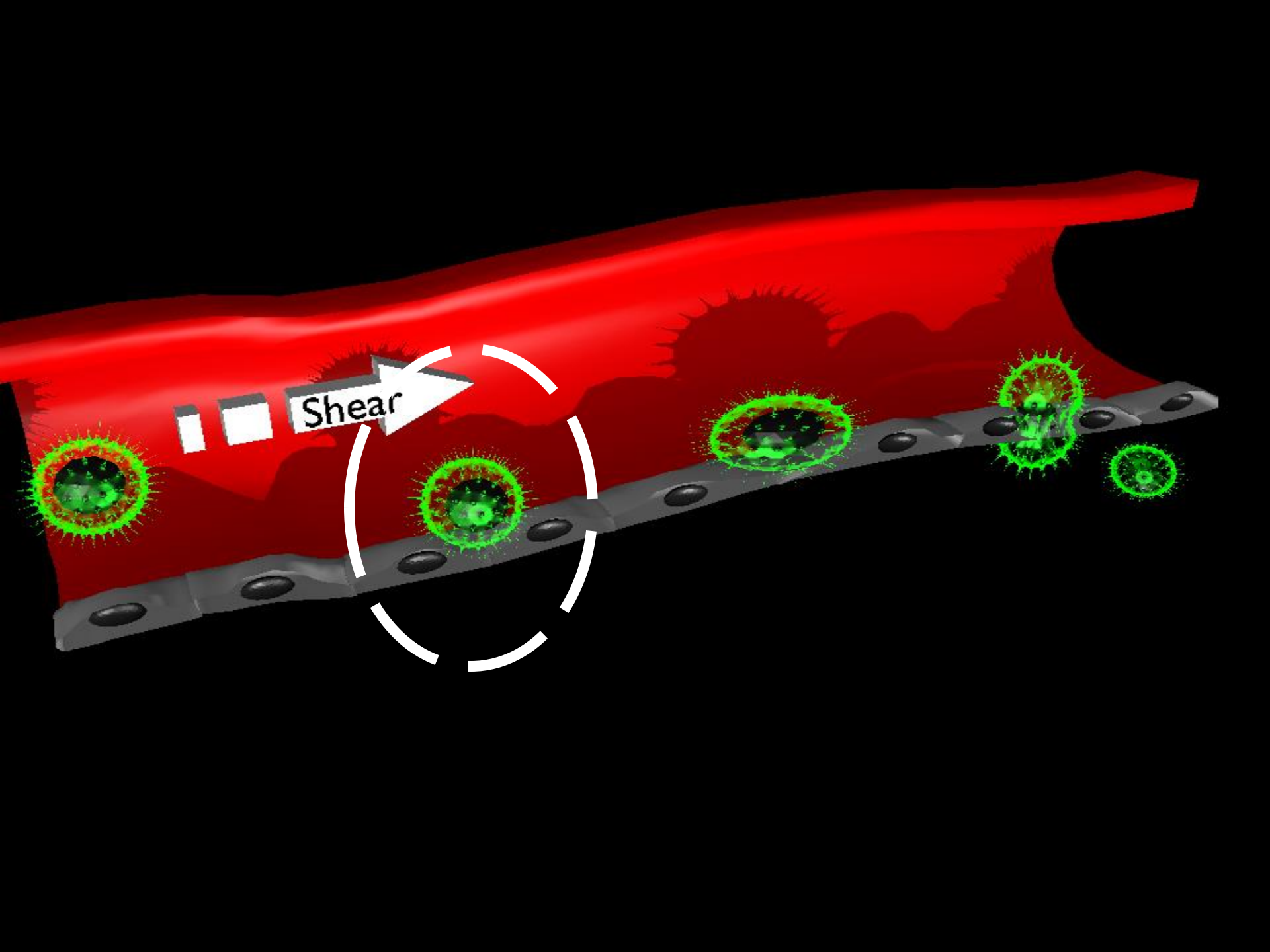
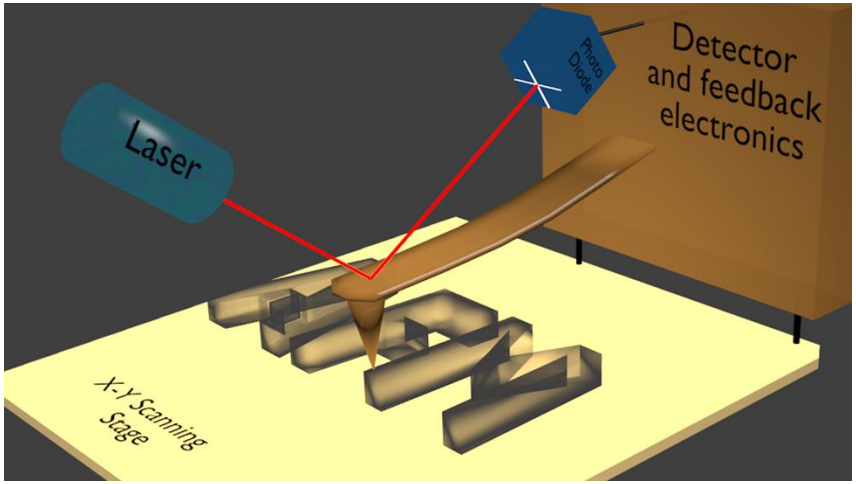
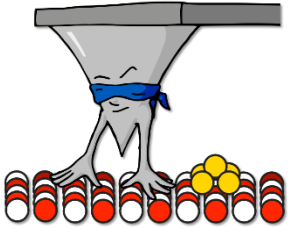
RBC2018 Zreče, May the 17th 2018

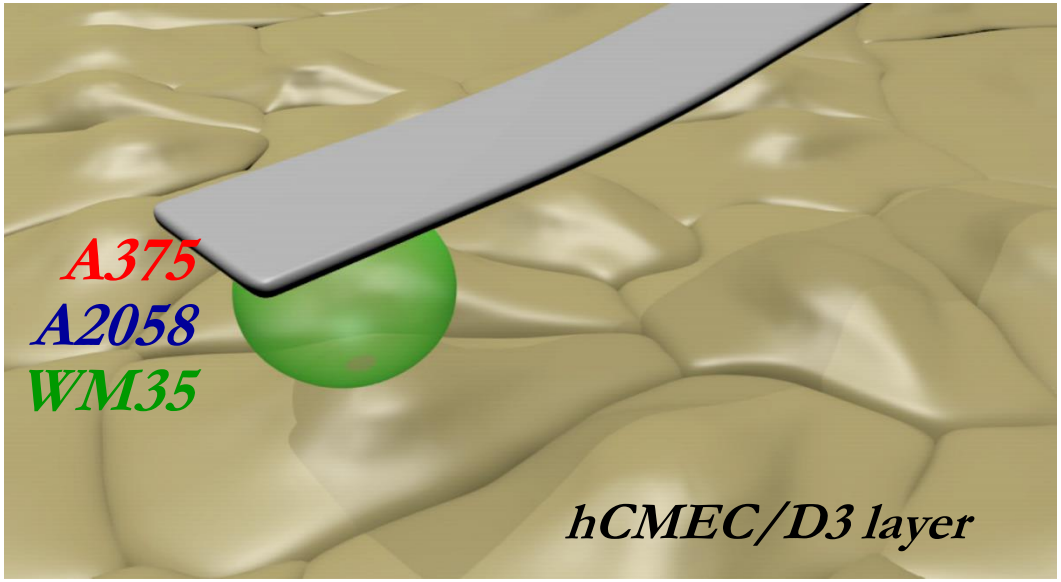

metastases
in brain
melanoma cells
in blood stream
melanoma
Primary tumor


Shear

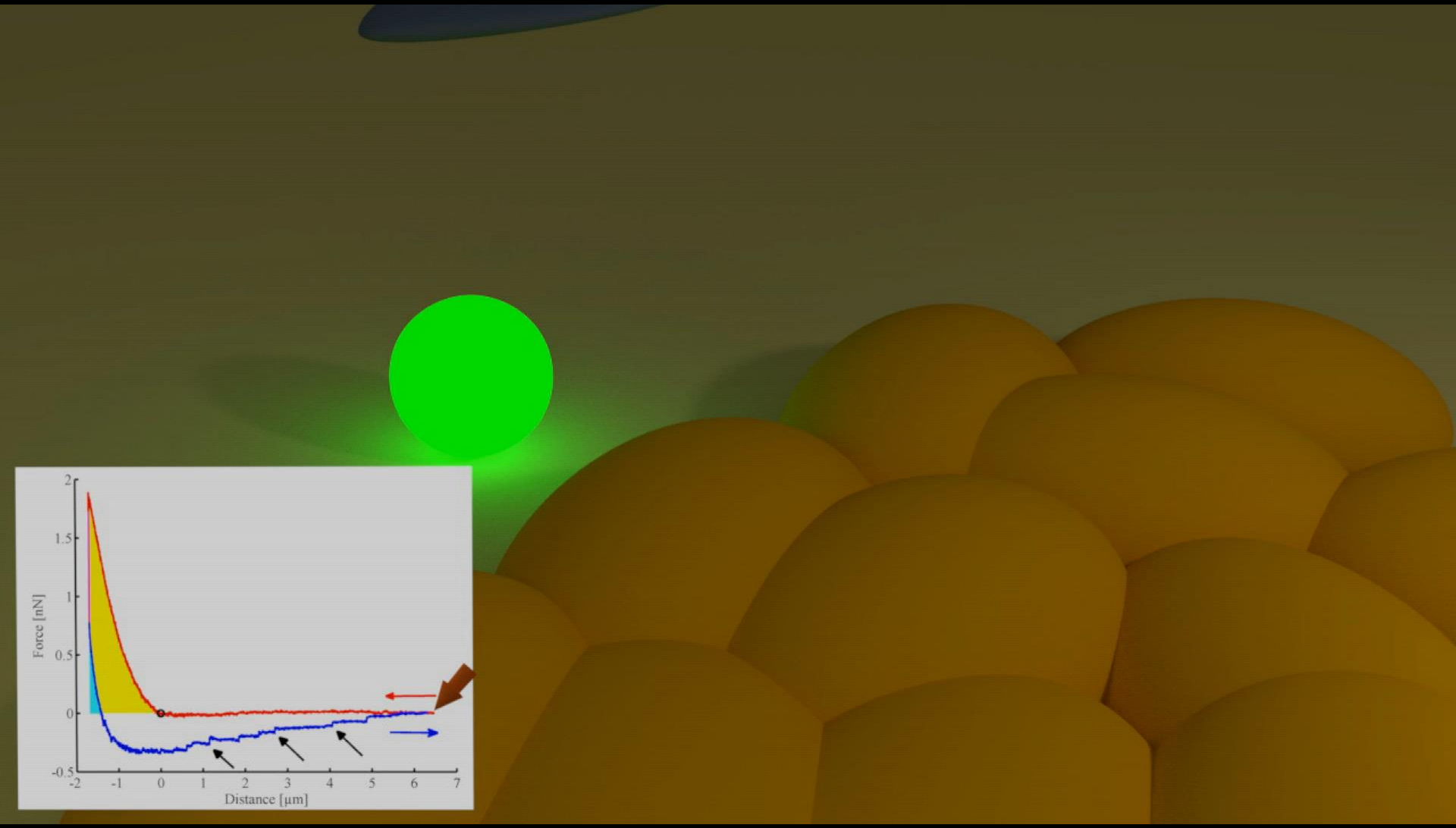




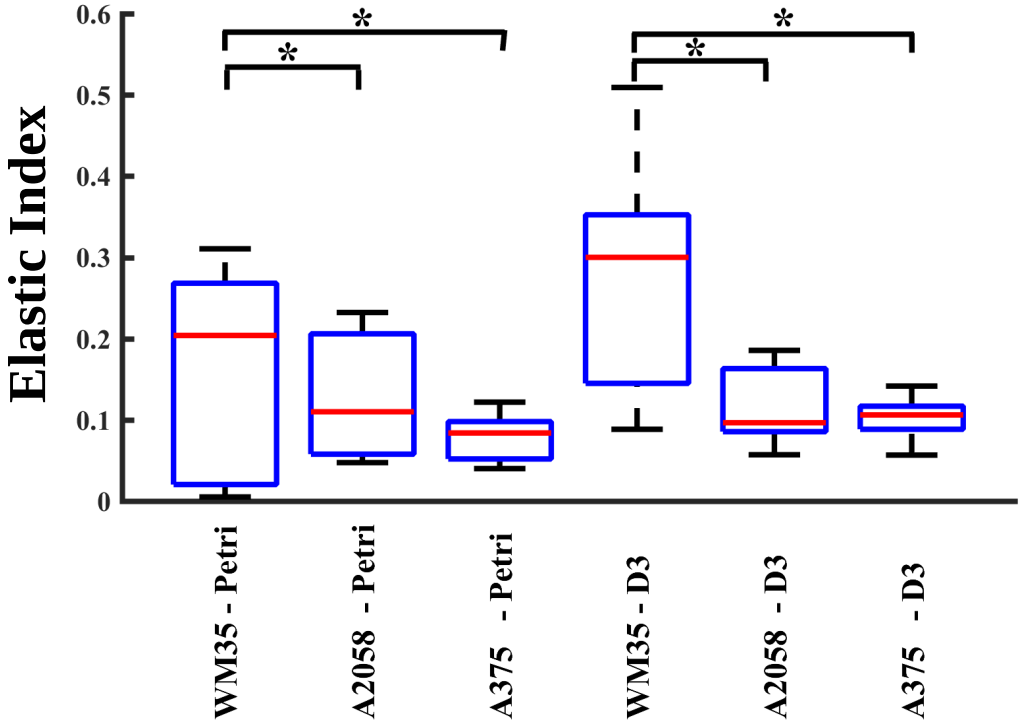
MFP 3D Asylum Research

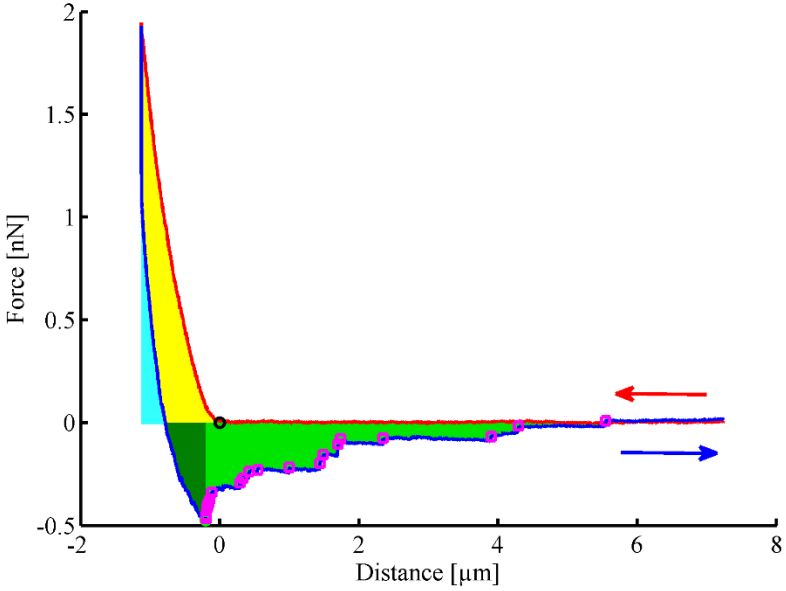


BRAF, V600E
NRAS^{wt}


Force [nN]
2
1.5
1
0.5
0
-0.5
-2
-1
0
1
2
3
4
5
6
7
Distance [µm]

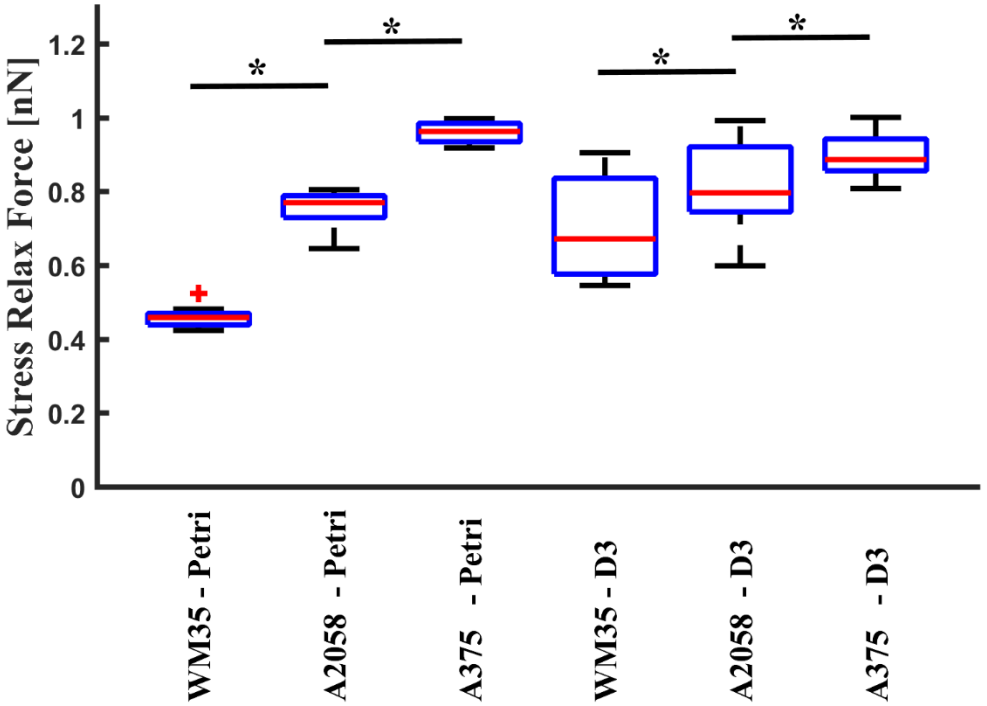
* *Kruskal-Wallis one way ANOVA, p<0.05*

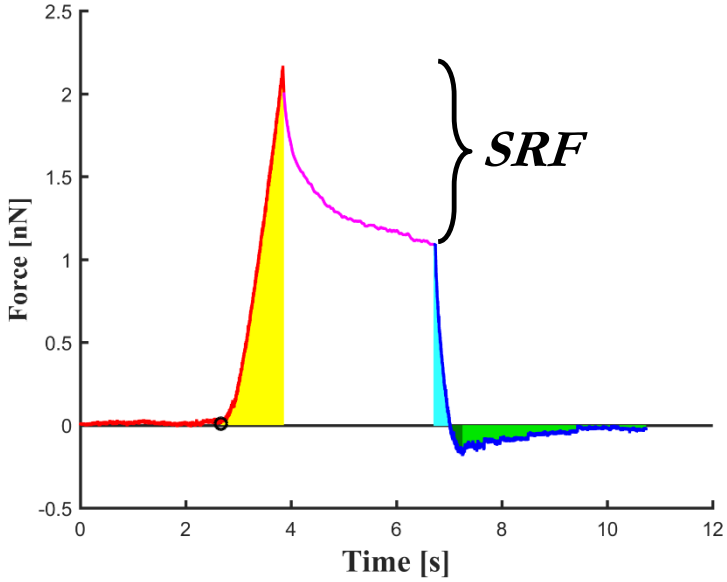


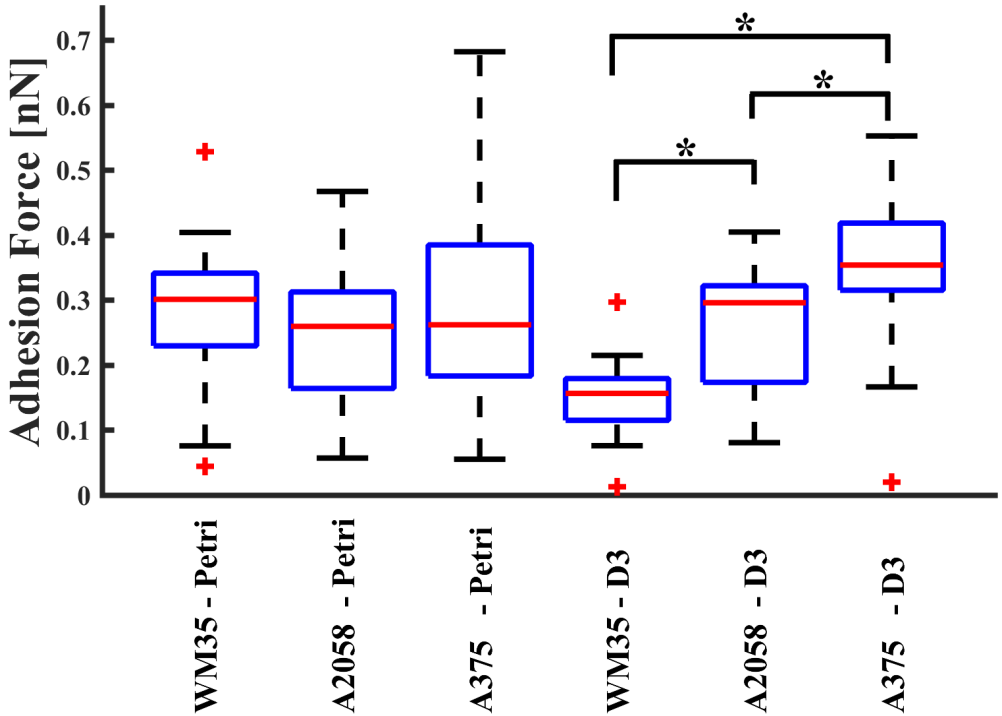


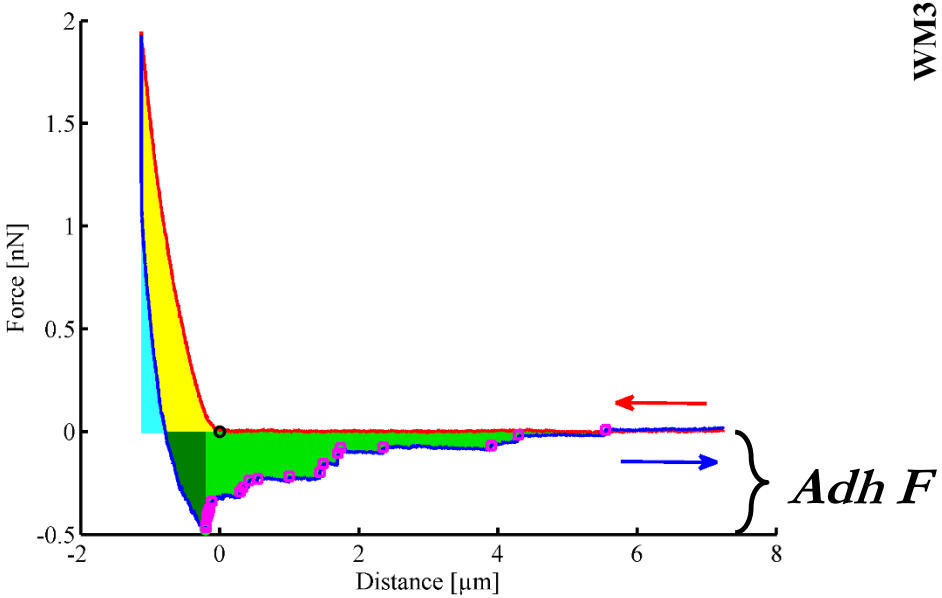
$$\textit{Elastic Index} = \frac{\textit{Remanent work}}{\textit{Indenting work}}$$

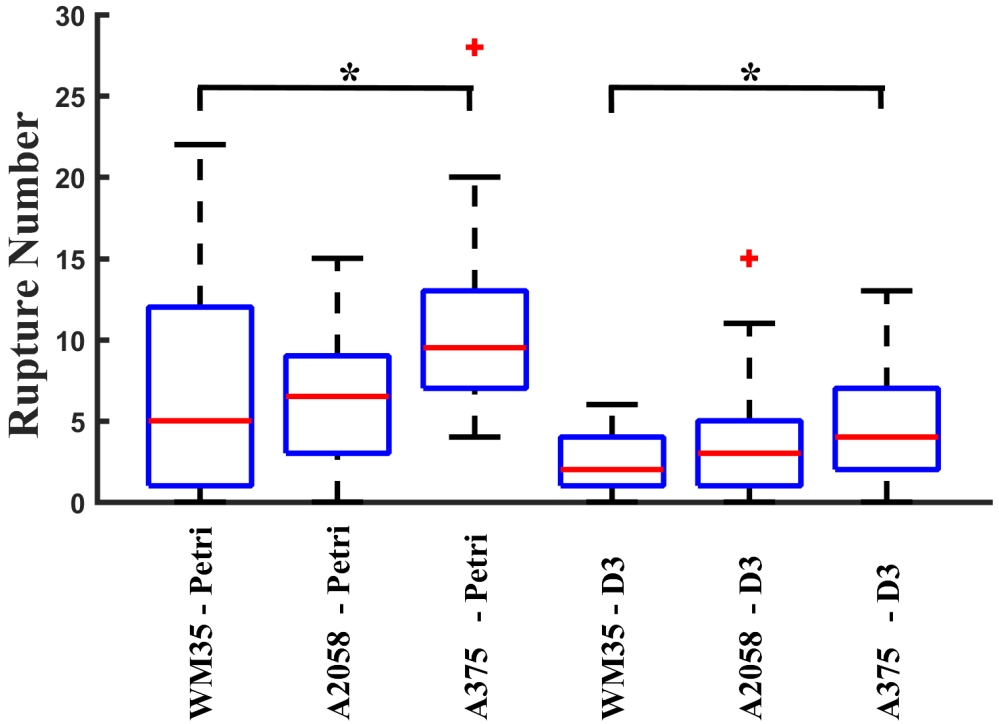
Varga et al. 2018 DOI: 10.1016/j.bbagen.2017.10.013

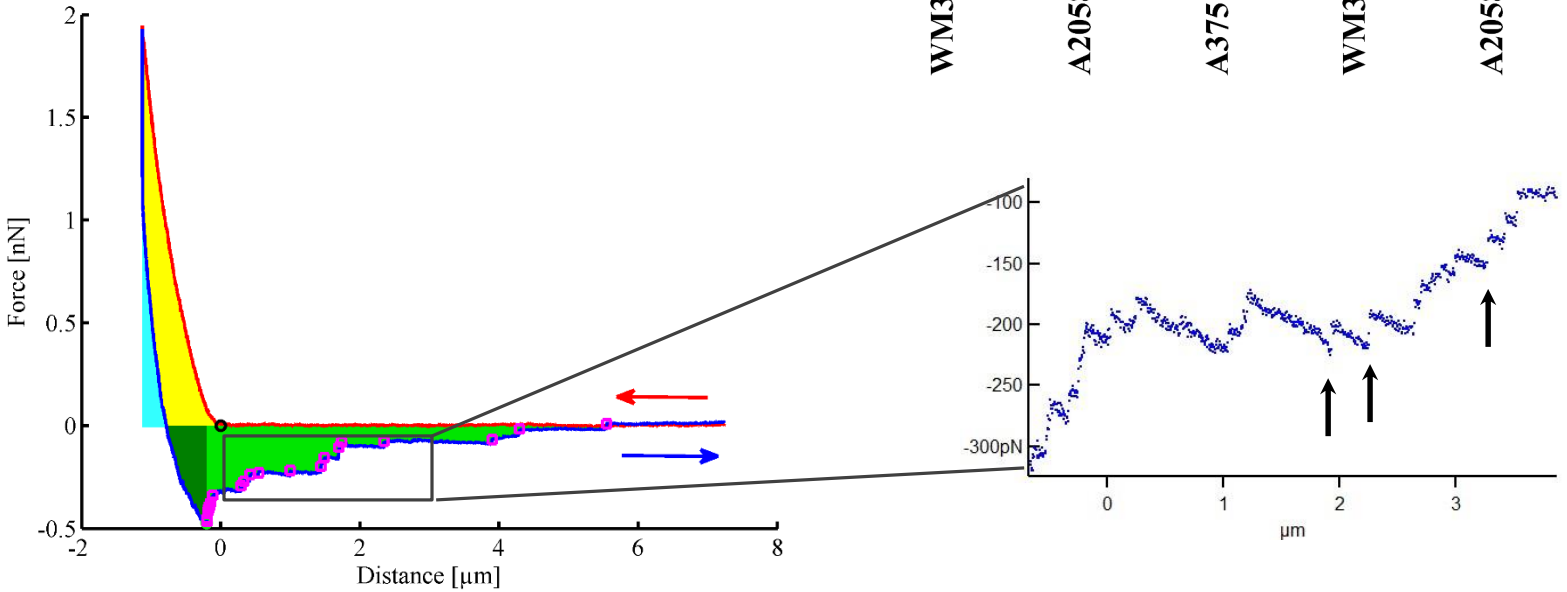

Stress Relax Force [nN]
1.2
1
0.8
0.6
0.4
0.2
0
*
*
*
*
WM35 - Petri
A2058 - Petri
A375 - Petri
WM35 - D3
A2058 - D3
A375 - D3

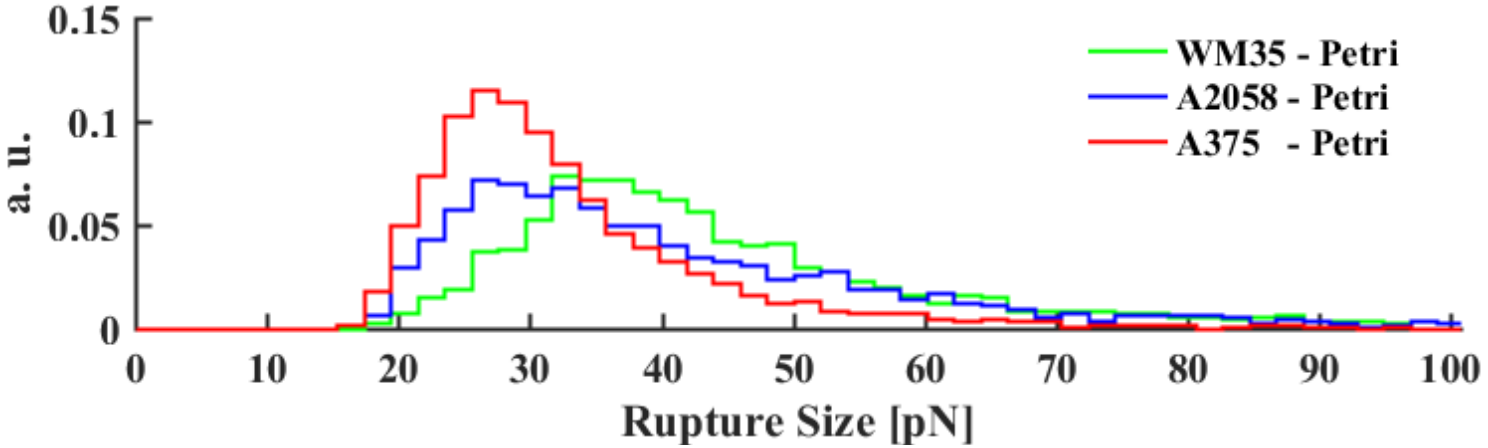

Force [nN]
2.5
2
1.5
1
0.5
0
-0.5
0
2
4
6
8
10
12
Time [s]
SRF

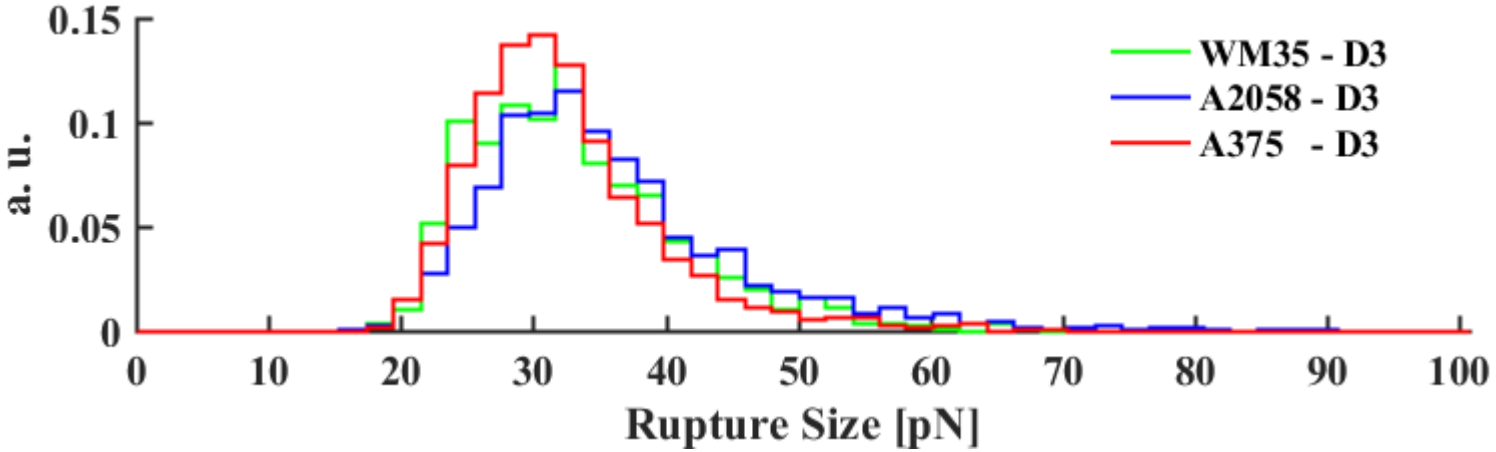

Adhesion Force [nN]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
*
*
*
WM35 - Petri
A2058 - Petri
A375 - Petri
WM35 - D3
A2058 - D3
A375 - D3

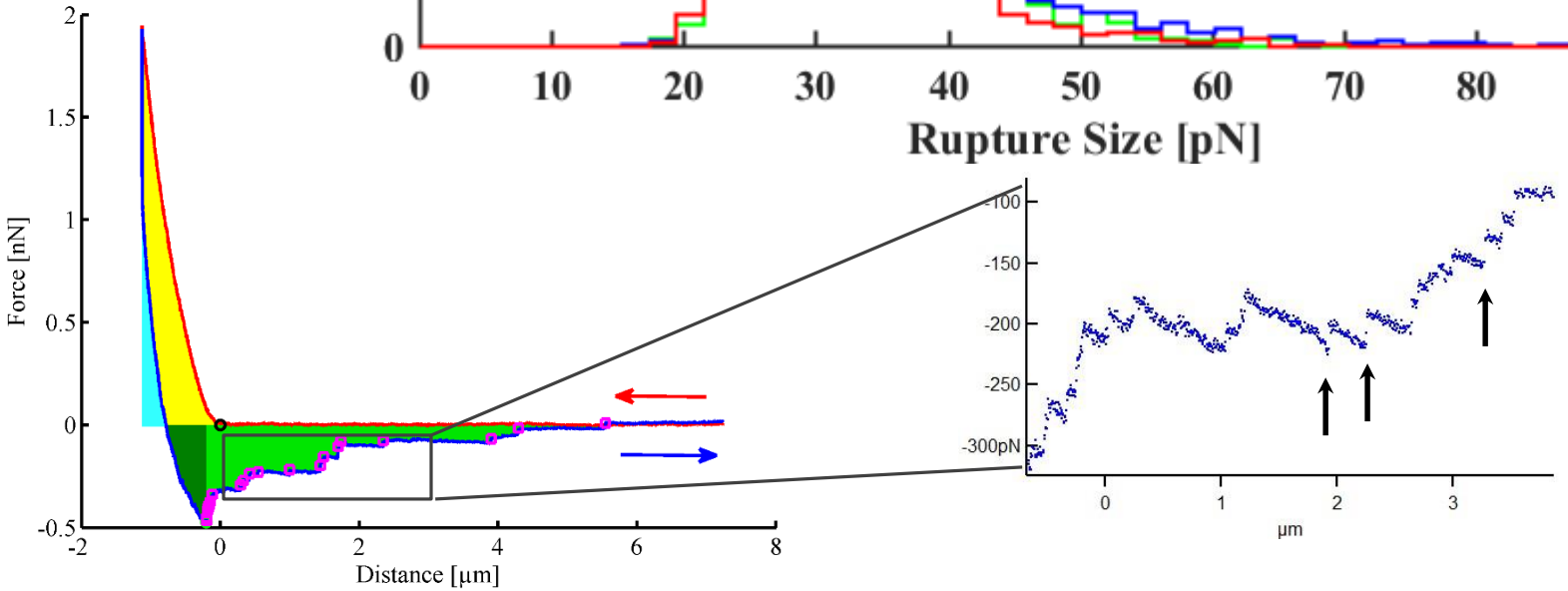

Force [nN]
2
1.5
1
0.5
0
-0.5
-2
0
2
4
6
8
Distance [µm]
Adh F

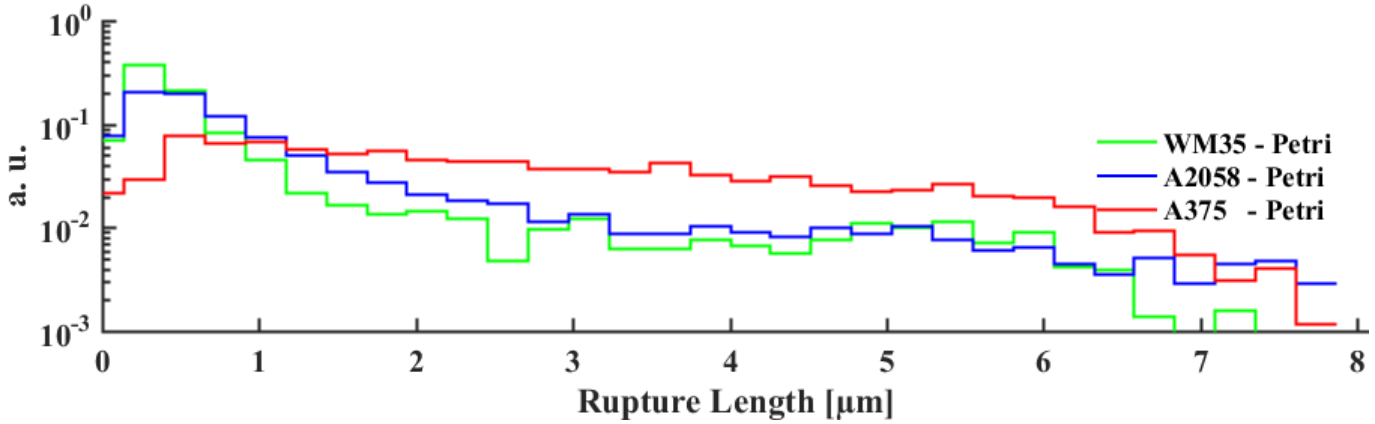

Rupture Number
30
25
20
15
10
5
0
*
*
WM35 - Petri
A2058 - Petri
A375 - Petri
WM35 - D3
A2058 - D3
A375 - D3

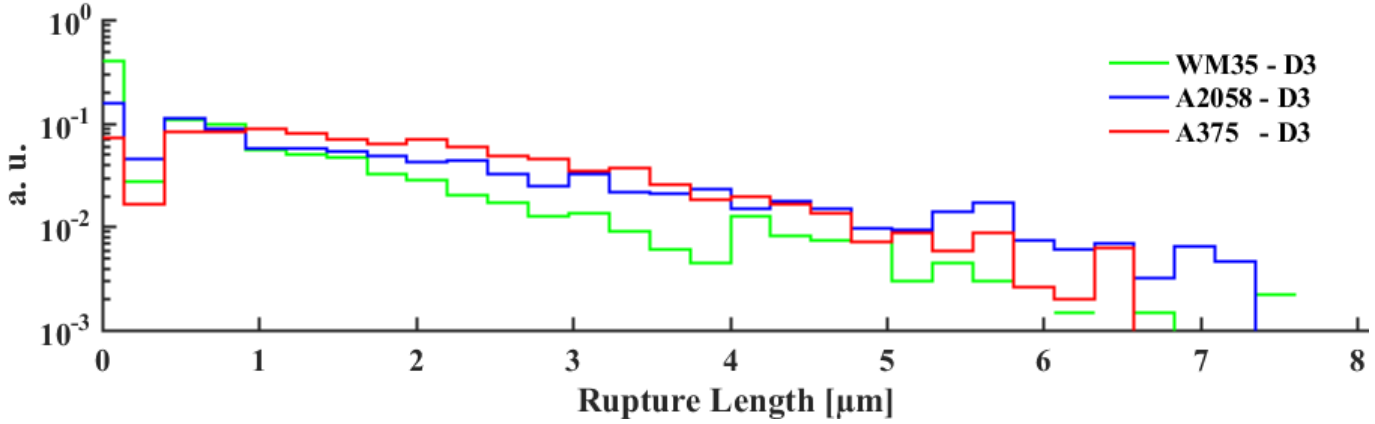

Force [nN]
2
1.5
1
0.5
0
-0.5
-2
0
2
4
6
8
Distance [µm]
-100
-150
-200
-250
-300pN
0
1
2
3
µm

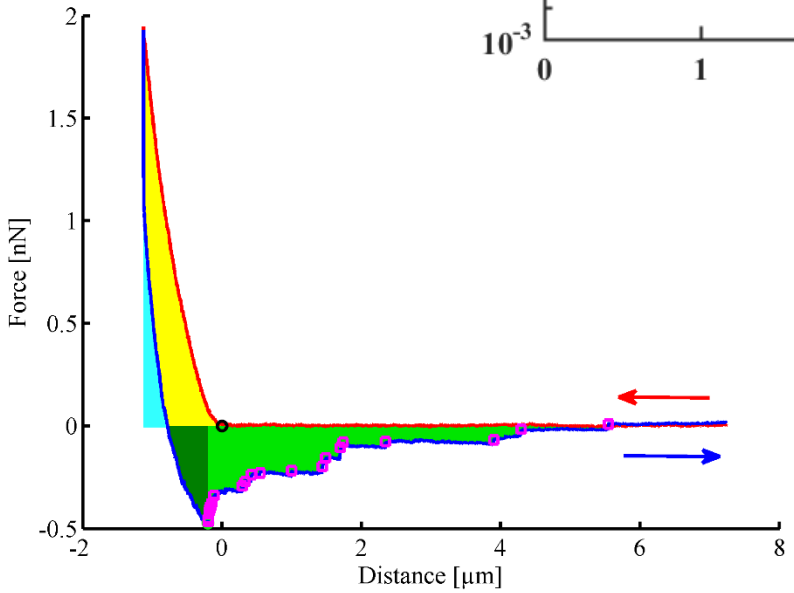

0.15
0.1
0.05
0
a. u.
WM35 - Petri
A2058 - Petri
A375 - Petri
0
10
20
30
40
50
60
70
80
90
100
Rupture Size [pN]


0.15
0.1
0.05
0
a. u.
WM35 - D3
A2058 - D3
A375 - D3
0
10
20
30
40
50
60
70
80
90
100
Rupture Size [pN]


2
1.5
1
0.5
0
-0.5
Force [nN]
-2
0
2
4
6
8
Distance [µm]
-100
-150
-200
-250
-300pN
0
1
2
3
µm


a. u.
Rupture Length [µm]
WM35 - Petri
A2058 - Petri
A375 - Petri


a. u.
Rupture Length [µm]
WM35 - D3
A2058 - D3
A375 - D3


Force [nN]
Distance [µm]

Summary

- ✓ **Force-spectroscopy: direct measurement of intercellular de-adhesion dynamics on living cells**
- ✓ **De-adhesion dynamics can be measured with pN resolution**
- ✓ **Nanomechanical parameters reflect the invasive potential of melanoma cells**
- ✓ **Membrane nanotubes play important role in the adhesion pattern between melanoma and brain endothelial cells**

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BJ

Thank you for your kind attention!