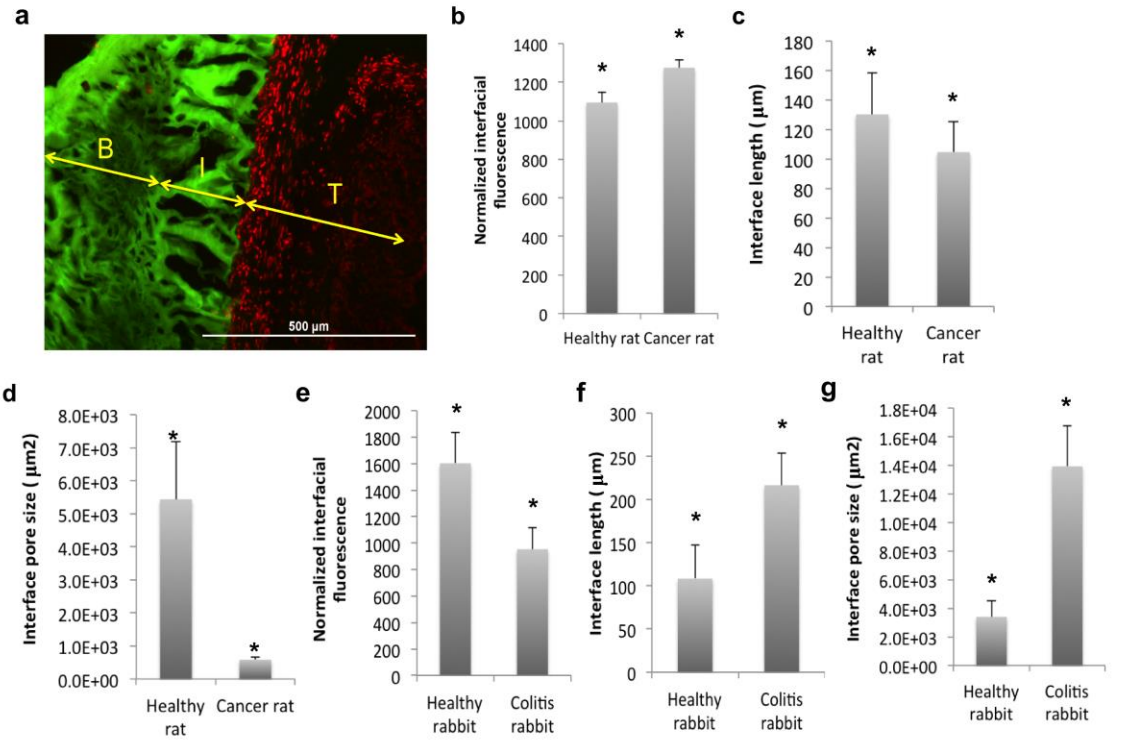
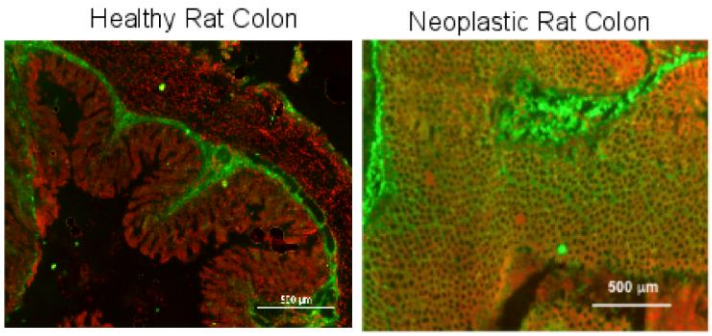
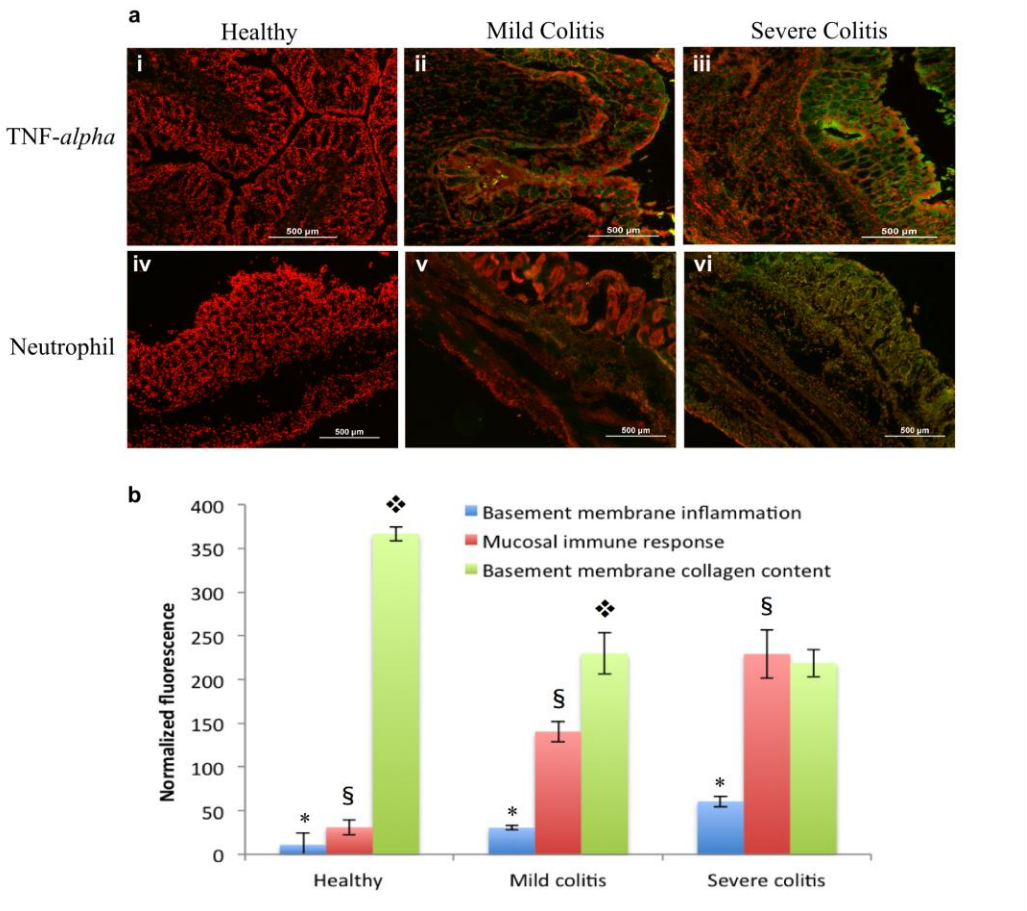


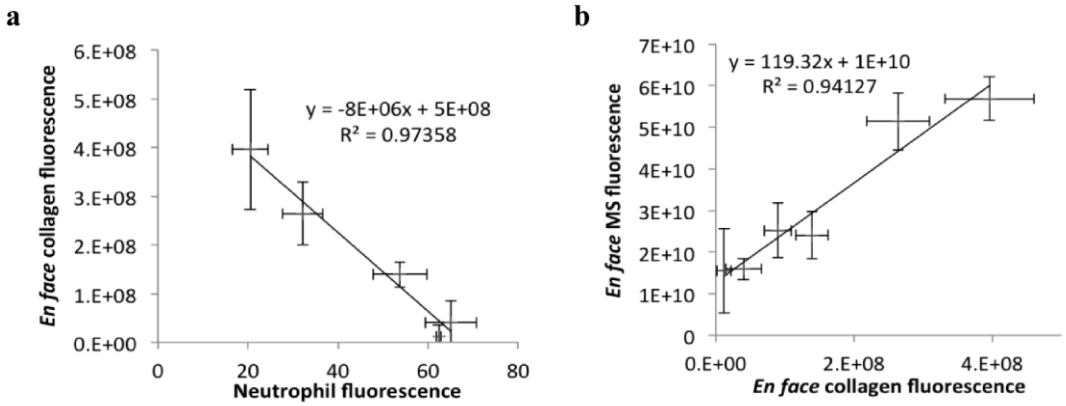
Supplemental Figure 1. Dendrimer:dextran Interfacial Morphology Characterization in Inflammation and Neoplasia. (a) Morphology of the interfacial region between fluorescein tagged adhesive material (green) (B – bulk, and I – interface) and excised rabbit colon tissue (T), stained with propidium iodide (red). (b) Interfacial fluorescence when material was applied to healthy and cancerous rat colon was quantified as a surrogate for material adhesion/interaction with the tissue. Interfacial (c) length and (d) pore size was measured in healthy and cancerous states in rat colon ($p < 0.05$). Interfacial (e) fluorescence, (f) length and (g) pore size were also measured in healthy and colitic rabbit colon ($p < 0.05$).



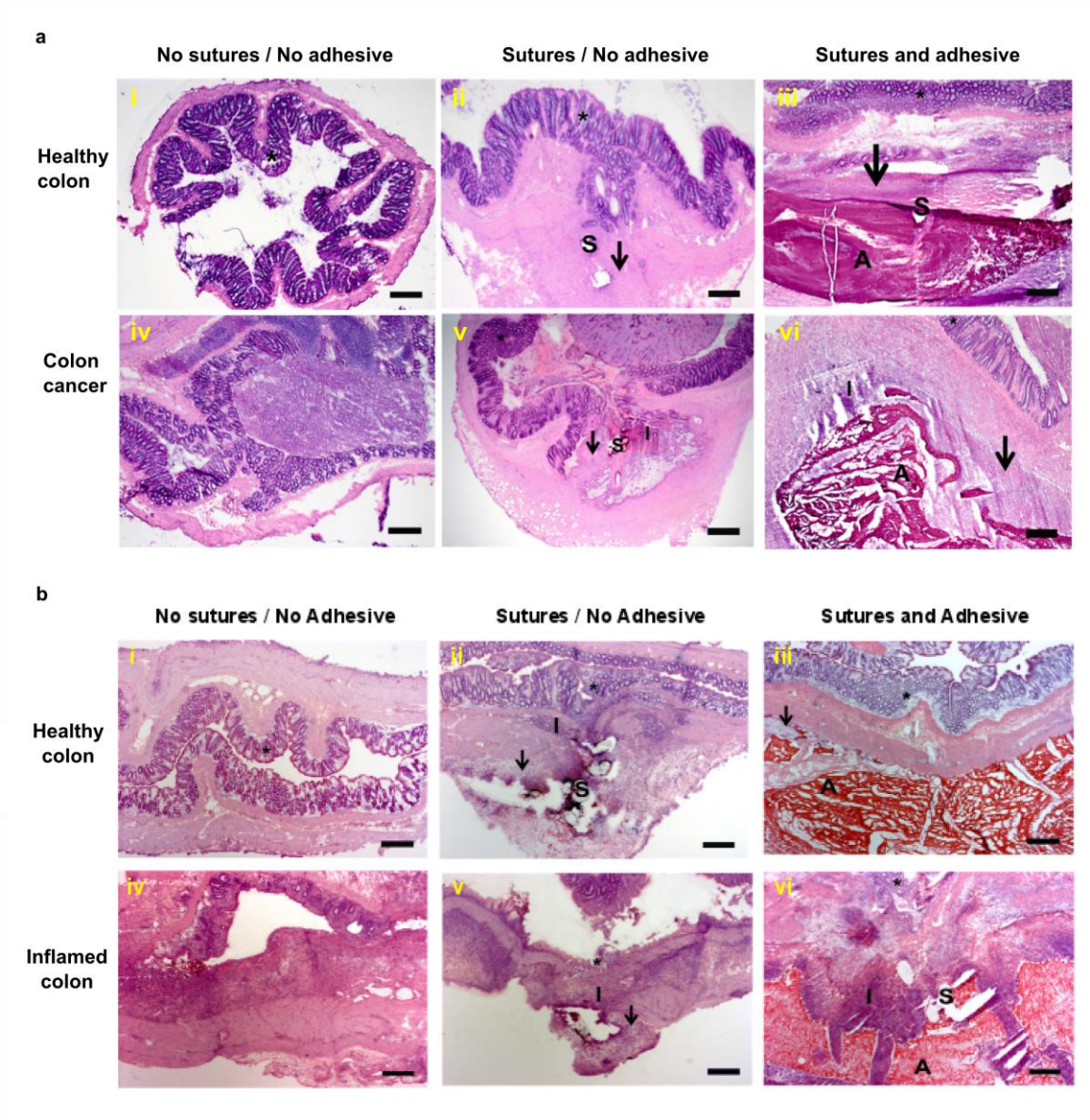
Supplemental Figure 2. Collagen I Immunostaining in Healthy and Neoplastic Tissues. Basement membrane collagen I (COL-I) immunostaining (green, FITC-conjugated secondary antibody) in healthy and neoplastic rat colon (red, stained with propidium iodide).



Supplemental Figure 3. Study of Alterations in Tissue Biological and Chemical Cues as a Function of Disease Severity. (a) Immunofluorescence staining against mucosal TNF-α (i-iii) and basement membrane neutrophils (iv-vi) were performed in rabbit healthy, mild and severe colitis tissues. (b) Normalized fluorescence from mucosal TNF-α, neutrophils and basement membrane collagen in the tissue sections was quantified ($p < 0.05$).



Supplemental Figure 4. *En face* Collagen I Correlations with Neutrophil Recruitment and Microspheres Conjugation. *En face* collagen content (b), measured by immunofluorescence staining, correlates with neutrophil recruitment to the colorectal wall, as measured by fluorescence immunostaining on tissue sections. Collagen content *en face* (c) also correlates linearly with the serosal amine content, as measured by aldehyde-coated fluorescent microspheres *en face*.



Supplemental Figure 5. ***In vivo*** **Hematoxylin and Eosin Staining Images.** (a) Hematoxylin and eosin (H&E) staining of rat healthy and cancerous tissues without treatment (i and iv), sutural closing of anastomoses site (ii and v) and combination of sutures and adhesive (iii and vi). (b) Hematoxylin and eosin (H&E) staining of rabbit healthy and colitic tissues without treatment (i and iv), sutural closing of anastomoses site (ii and v) and combination of sutures and adhesive (iii and vi).

Mechanical testing G20%&D25%			
Healthy Rat	**Cancer Rat**	**Healthy rabbit**	**Colitic rabbit**
0.82	0.5	1.08	0.29
0.79	0.7	0.83	0.43
0.85	0.56	0.72	0.56
0.74	0.54	0.71	0.34
0.84	0.53	0.72	0.17

Supplemental Table 1. Tabulated data from Figures 1c and 1d.

Mechanical testing G20% and varying dextran aldehyde compositions			
7.50%	**10.00%**	**15.00%**	**25.00%**
0.28	0.34	0.6	1.08
0.21	0.37	0.69	0.83
0.24	0.33	0.51	0.72
0.29	0.3	0.7	0.71
0.22	0.29	0.48	0.72

Supplemental Table 2. Tabulated data from Figure 1e.

Mechanical testing G20% on healthy and colitic tissues	
Healthy 10%	**Colitic 25%**
0.34	0.29
0.37	0.43
0.33	0.56
0.3	0.34
0.29	0.17

Supplemental Table 3. Tabulated data from Figure 1f.

Cancer microenvironment characterization			
MS		**COL-I**	
Healthy Rat	**Cancer Rat**	**Healthy Rat**	**Cancer Rat**
23.73796	47.89796	20.2886	35.4532
36.77796	55.58796	6.02192	28.0112
21.16796		16.531	37.4784

Supplemental Table 4. Tabulated data from Figure 2a.

Colitis microenvironment characterization			
MS		COL-I	
Healthy Rabbit	Colitis Rabbit	Healthy Rabbit	Colitis Rabbit
49.8375	12.42115	32.215	8.57
57.9875	15.90115	27.705	2.676
38.4875	19.25115	32.245	3.275
48.5275	17.31115	41.175	2.155
86.1875	14.72115	31.685	3.327
55.40208	20.32115	43.659	1.619
54.45208	24.39115	47.449	1.289
60.75208	19.97115	33.009	0.111
50.13208	21.96115	32.959	2.746
63.27208	18.52115	40.839	0.441

Supplemental Table 5. Tabulated data from Figure 2b.

Healthy rat in vivo data								
Healthy			Healthy + Sutures			Healthy + Sutures + Adhesive		
Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils
0	0	0	2	2.5	3	2.5	4	4
0	0	0	2	4	2.5	2.5	4	4
0	0	0	2	1	0.5	1.5	4	4
0	0	0	2	4	3	1	2.5	2
0	0	0	2	4	3	1	4	4

Supplemental Table 6. Tabulated data from Figure 4b.

Cancer rat in vivo data								
Cancer			Cancer + Sutures			Cancer + Sutures + Adhesive		
Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils
1	0	0	0.5	2.5	4	2	4	4
1	0	0	2.5	2.5	4	1.5	4	4
1	0	0	2	2	4	1.5	4	4
1	0	0	1.5	4	4	1.5	4	4
1	0	0	1.5	2	3	1	4	4

Supplemental Table 7. Tabulated data from Figure 4c.

Healthy rabbit in vivo data								
Healthy			Healthy + Sutures			Healthy + Sutures + Adhesive		
Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils
0	0	0	2	3	3	0.5	1	1
0	0	0	1	3	3	0.5	2.5	3
0	0	0	1.5	2.5	4	0.5	3	1.5
0	0	0	1.5	4	3	0.5	2	2
0	0	0	1.5	3	2.5	1	2.5	3

Supplemental Table 8. Tabulated data from Figure 4d.

Colitis rabbit in vivo data								
Colitis			Colitis + Sutures			Colitis + Sutures + Adhesive		
Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils	Inflammation	Fibrosis	Heterophils
4	0	0	4	2	1.5	4	3	4
4	0	0	4	1	2.5	4	4	4
4	0	0	4	2	2.5	4	2.5	4
3	0	0	4	2	1.5	4	4	4
4	0	0	4	1.5	2	4	2.5	4

Supplemental Table 9. Tabulated data from Figure 4e.