

4-18-2012

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"The Effect of Heat Treatment and Surface Functionalization on the Bio-Kinetic Behavior of Carbon Nanomaterials" (2012). *Stander Symposium Posters*. 53.  
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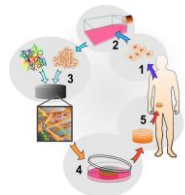
# The Effect of Heat Treatment and Surface Functionalization on the Bio-Kinetic Behavior of Carbon Nanomaterials

Kevin Donnelly

Advisor: Kalid Lafdi, Ph. D.

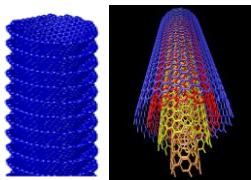
## Introduction

- Tissue engineering would like to use carbon nanomaterials more extensively in future applications
- They are excellent candidates because:
  - high strength to weight ratio
  - novel physical properties
  - tunable surface chemistry
- More must be understood about the bio-effects of their various properties.
- This research studied the effects of heat treatment and ozone functionalization on a variety of carbon nanomaterials



Cycle of tissue engineering

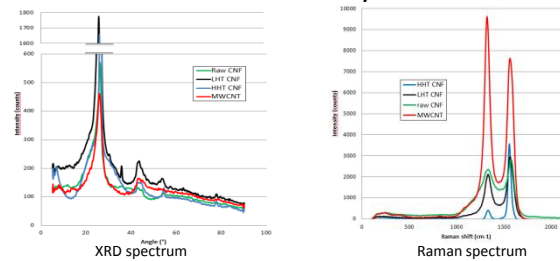
## Materials



Graphical representation of CNF and CNT

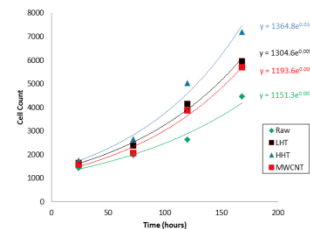
## Methods

- Materials characterized by XRD and Raman
- Cell growth was quantified by WST-1 cell proliferation assay

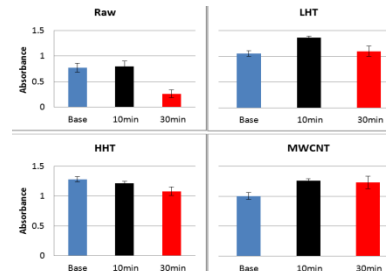


## Results

### Heat Treated



### Ozone Functionalized



## Bio-Kinetics

### Heat Treatment

$$Cell\ Count = [-4557.7(d_{002}) + 16830] * e^{[-.0531(d_{002})+.1902]*(time)}$$

### Ozone Functionalized

#### Raw CNF

$$Cell\ Count = [-.7017(oz^2) + 24.62(oz) + 1151] * e^{[-.0002(oz)+.0081](time)}$$

#### LHT CNF

$$Cell\ Count = [-2.645(oz^2) + 86.65(oz) + 1304] * e^{[5*10^{-6}(oz^2)-.0002(oz)+.0092](time)}$$

#### HHT CNF

$$Cell\ Count = [-7.4721(oz) + 1421] * e^{[3*10^{-6}(oz^2)-9*10^{-5}(oz)+.0101](time)}$$

#### MWCNT

$$Cell\ Count = [-2.261(oz^2) + 65.97(oz) + 1140] * e^{[9*10^{-6}(oz^2)-.0003(oz)+.0101](time)}$$

## Conclusions

- Heat treatment increases cell growth for CNF
- The effects of ozone treatment are material dependent, but tend to decrease proliferation at higher treatment times

## Recommendations

More research should be done to determine the effects of other treatments and functionalizations on carbon nanomaterials so they may be better used in tissue engineering applications