Lecture 1: "Need for New Perspectives on Medicine"

1.1 Nanotechnology – Why is something so small so big?
   1.1.1 Definitions of nanotechnology based on size
   1.1.2 A “bottoms up” rather than “tops down” approach
   1.1.3 The nanoworld challenges our perspectives on size

1.2 The Progression of Medicine
   1.2.1 Conventional "modern" medicine
   1.2.2 "Personalized" or "molecular" medicine
   1.2.3 Nanomedicine "single-cell" medicine

1.3 How Conventional Medicine Works for Diagnosis of Disease
   1.3.1 Identification of the "diseased state"
   1.3.2 Simple measurements of body structure and function
   1.3.3 Follow-up clinical tests
   1.3.4 Internal examinations by non-invasive in-vivo imaging
   1.3.5 Molecular tests for specific gene properties
   1.3.6 Comparison of individual results with "normal ranges"

1.4 How Conventional Medicine Works for Treatment of Disease
   1.4.1 Stabilization of patient – "heal thyself"
   1.4.2 Surgical repair of injuries
   1.4.3 Treatment with drugs locally
   1.4.4 Treatment with drugs systemically
   1.4.5 Treatment with targeted therapies
1.5 Factors Limiting the Progress of Medicine

1.5.1 Economics

1.5.2 Politics

1.5.3 Regulation

1.6 Some Specific Problems with Conventional Medicine

1.6.1 Consequences of waiting for patient symptoms

1.6.2 Trained people and modern drugs are expensive

1.6.3 Diagnostic technologies, if available, are still relatively primitive and/or expensive

1.6.4 Crude targeting of drugs

1.7 What is the Basis for Nanomedicine?

1.7.1 Creation of nano-sized tools

1.7.2 These nanotoools permit single-cell medicine

1.7.3 These “nanomedical systems” can be “smart” devices

1.8 Some ways that nanotechnologies will impact on healthcare

1.8.1 Nanomedicine will be “pro-active” rather than “reactive” medicine

1.8.2 Possibility of "regenerative medicine"

1.8.3 Blurring of distinction between prevention and treatment

Lecture 1: References

