



NANOTECHNOLOGY  
PUBLIC ENGAGEMENT

# CANCER TREATMENT with NANOTECHNOLOGY

HOW ARE YOU DOING TODAY? STILL FEELING VERY SICK FROM THE CANCER MEDICATION. BUT TAKE A LOOK AT THIS ARTICLE.

YES! SCIENTISTS ARE WORKING ON REDUCING THE SIDE EFFECTS OF CANCER DRUGS THAT ARE MAKING YOU FEEL SO SICK, BY DELIVERING MEDICATION TO **ONLY** WHERE THE BODY NEEDS IT.

IT'S CALLED TARGETED DRUG DELIVERY.

BUT HOW WILL IT WORK? THROUGH NANOTECHNOLOGY, THE SCIENCE OF THE **VERY SMALL**. IT'S OPENING A WORLD OF EXCITING POSSIBILITIES. LET'S GO AND SEE MORE!

NANO MEANS SMALL. **VERY SMALL**. THE DOCTOR'S SYRINGE IS ABOUT 80MM. WE NEED TO GET MUCH **SMALLER** THAN THAT.

THIS NEEDLE IS USED TO INJECT MEDICATION INTO THE BLOODSTREAM. ITS THICKNESS IS 100 TIMES **SMALLER** THAN THE SYRINGE.

80 mm (eighty millimetres) = 80 000 000 nm (eighty million nanometres)

800 µm (eight hundred micrometres) = 800 000 nm (eight hundred thousand nanometres)

0.8 mm

THESE RED BLOOD CELLS CARRY OXYGEN AROUND THE BODY. THEY ARE 100 TIMES SMALLER THAN THE NEEDLE AND MEASURE 8 MICROMETRES.

8 µm (eight micrometres) = 8 000 nm (eight thousand nanometres)

WE NEED TO GET **SMALLER** THAN THAT.

ARE WE IN THE NANOWORLD YET? YES, AND THESE ARE LIPOSOMES: NANO-PARTICLES LOADED WITH MEDICATION TO DESTROY CANCER CELLS.

THEY ARE 80 NANOMETRES, 100 TIMES SMALLER THAN A BLOOD CELL.

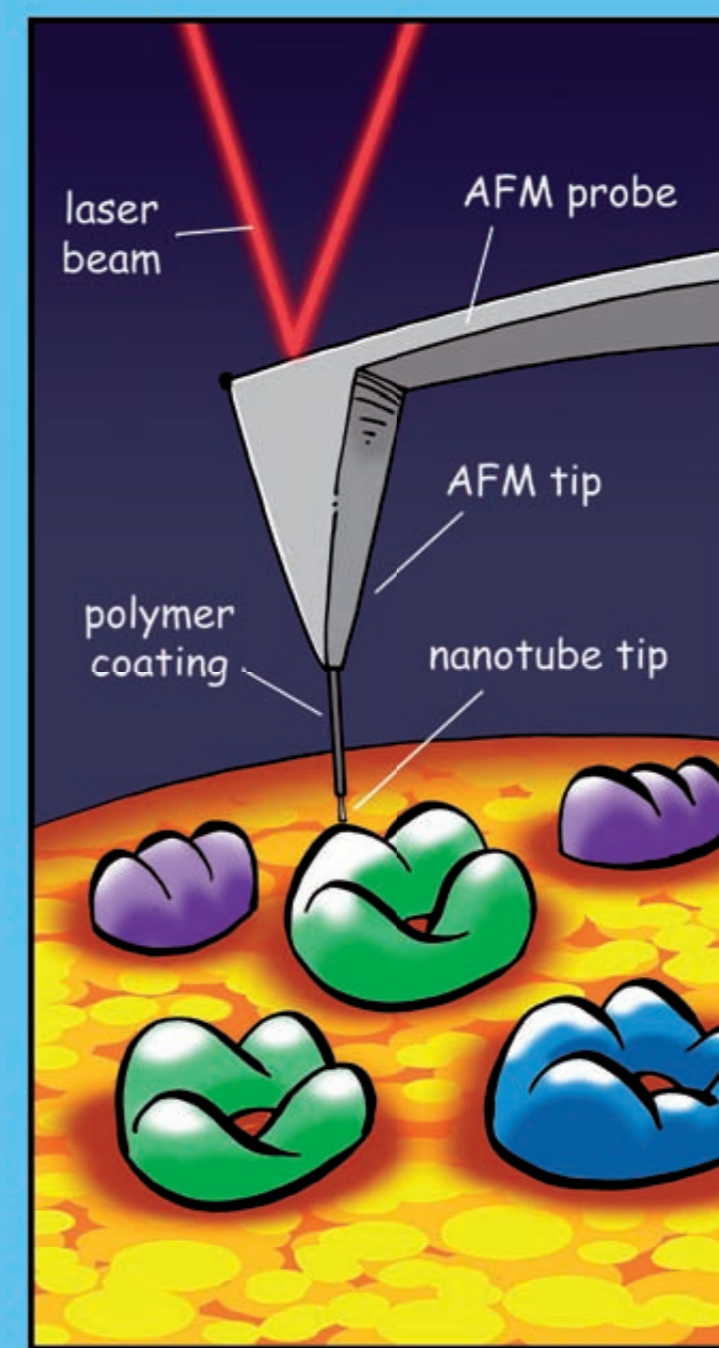
NANOPARTICLES LIKE LIPOSOMES ARE SO TINY THAT THEY CAN TRAVEL IN THE BLOOD STREAM, FINDING AND DESTROYING CANCER CELLS. LIPOSOMES ARE DESIGNED TO ONLY ATTACH TO CANCER CELLS WHERE THEY DELIVER THE MEDICATION, SO THEY WON'T CAUSE THE SIDE-EFFECTS THAT OCCUR WHEN HEALTHY CELLS ALSO GET MEDICATION.

WOW! NANOTECHNOLOGY REALLY IS OPENING NEW POSSIBILITIES - BUT SCIENTISTS WILL NEED TO BE CAREFUL TO **TEST** THE **SAFETY** OF TARGETED DRUG DELIVERY.

cancer cell  
liposome  
drugs  
healthy cells

## ATOMIC FORCE MICROSCOPE (AFM)

THE NANOWORLD IS SO **SMALL** THAT IT CAN'T BE SEEN WITH THE NAKED EYE OR A REGULAR MICROSCOPE. SCIENTISTS HAVE TO USE SPECIAL EQUIPMENT LIKE THE **ATOMIC FORCE MICROSCOPE (AFM)**. THE AFM "READS" THE NANOWORLD BY TOUCHING IT LIKE A BLIND PERSON READS **BRILLE**.



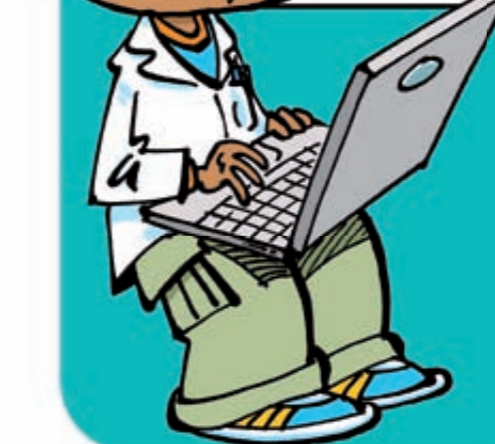
- The AFM has a sharp tip that travels over the nanoparticles
- As the tip follows the surface it goes up and down
- A laser beam senses the movement and forms an image on a computer screen



ATOMIC FORCE MICROSCOPES ARE BEING USED TO MEASURE HOW TIGHTLY LIPOSOMES ATTACH TO CANCER CELLS, WHEN THEY DELIVER MEDICATION.

## NANO CAREERS

NANOTECHNOLOGY IS NOT ONLY USED IN MEDICINE. IT'S OPENING A WORLD OF NEW POSSIBILITIES AND CAREERS IN SCIENCE AND TECHNOLOGY.



- CREATE NEW MATERIALS
- BUILD FASTER COMPUTERS
- DEVELOP CLEANER TECHNOLOGIES