

# Micro-fluidics for disease detection!

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HELLO! WHAT ARE YOU WORKING ON?

DEVICES TO HELP DISEASE DETECTION

OH! WHAT DISEASES?

DISEASES CAUSED BY PATHOGENS!

...LIKE MALARIA, AFFECTING A VAST GEOGRAPHICAL AREA, CAUSING OVER 0.5 MILLION DEATHS A YEAR...

RED BLOOD CELLS ATTACKED BY VIRUSES

WELL, THAT WON'T BE AFFECTING ME IN SCOTLAND THEN!

...HOLD ON! HAVE A LOOK AT THE NEWS!

Keep boiling tap water, says firm

Bottled water panic after bug warning

OHH!!!

DAILY MIRROR, 07.08.2015 & 08.08.2015

SUNDAY EXPRESS, 09.08.2015

PATHOGENS IN DRINKING WATER COULD INFECT YOU TOO...

"MICRO-FLUIDIC" DEVICES CAN HELP QUICKLY DETECT SUCH PATHOGENS

CRYPTOSPORIDIUM PATHOGEN

HUH! WHAT'S "MICRO-FLUIDIC"?

WELL, YOU ARE FAMILIAR WITH ELECTRONIC MICRO-CHIPS IN PHONES/COMPUTERS...

"MICRO-FLUIDIC" DEVICES ARE SIMILAR, BUT INSTEAD OF ELECTRIC CURRENT THEY CARRY "FLUIDS" (WATER, OIL, BLOOD...)

COOL!

THESE DEVICES ARE EXTREMELY SMALL, WITH STRUCTURES SIMILAR IN SIZE TO A SINGLE CELL

SEE... A MICRO-DEVICE COMPARED WITH A SINGLE HUMAN HAIR

WE USE THESE DEVICES IN RESEARCHING BLOOD CELL SEPARATION...

...AS, OWING TO THEIR SMALL SCALE, THEY CAN MANIPULATE INDIVIDUAL CELLS/PATHOGENS, AND HELP DIAGNOSE INFECTIONS

MANIPULATE THEM! HOW??

LET ME EXPLAIN WITH AN EXAMPLE

SEE THIS MICRO-FLUIDIC DEVICE CALLED "DLD"...

LOOKS LIKE PILLARS IN A CHANNEL!!

DLD = DETERMINISTIC LATERAL DISPLACEMENT

WHITE BLOOD CELLS, RED BLOOD CELL, PLATELETS

THAT'S WHAT THEY ARE!

BUT ARRANGED SO AS TO DIVIDE AND CREATE SMALL "FLUID LANES"

"LANE 1" "LANE 2"

AT EACH PILLAR GAP, BIG PARTICLES CAN'T FIT THROUGH LANE 1 AND ARE "BUMPED" INTO LANE 2

...BUT SMALLER PARTICLES CAN SQUEEZE PAST AND REMAIN IN LANE 1 THROUGH EACH GAP

PARTICLES = CELLS/PATHOGENS

BIG PARTICLES SWITCH LANES AT EACH PILLAR WHILE SMALLER ONES DON'T...

...LEADING TO SEPARATION OF PARTICLES

SUCH SEPARATION CHIPS LIKE "DLD" CAN BE USED FOR DETECTION/TESTING/DIAGNOSIS ETC...

AHA! I SEE, AND BETTER STILL, SUCH CHIPS COULD BE TAKEN TO PATIENTS INSTEAD OF THE OTHER WAY AROUND!

credits:

JIMENEZ IN B BAKER & ANGRY PATHOGENS, HOW TO GET RID OF THEM: INTRODUCING MICROFLUIDICS FOR INTRODUCTION PATHOGEN SEPARATION TO CHEMISTS, LAB CHIP 15 (2), P 963-965, 2015

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