

### Bioelectrical signals

a grp of cells    nerve & muscle cells

cardiac            exert electrical signals  
muscle            naturally

cell membrane potential - stimuli (*electric*) - excited - pass threshold - action potential - generate electric field

EMG, EOG, ERG

### Bio-acoustic signals

sounds from the human body as it functions, giving information of the body's inner condition

lung (*breathing*), heart (*blood flow*), bowel, joint (*bone cracking*)

noninvasive and easy way of examination

sound sensor apparatus    receive the bio-acoustic signals

### Biomechanical signals

movement    motion & displacement signals, pressure & flow system

skeletal muscles    movement of the limbs

chest wall    movement of chest - respiratory activity - examine rib cage injury

### Bio-optic signals

light            change in optical properties

alive cells = emit light energy    dead cells = no emit light energy

blood oxygenation    measure the transmitted light from cells at different wavelengths

reflection or pulse rate by the change in skin color

### Biochemical signals

measurement of the chemicals in the body    directly from the living cells or in the form of samples

CO<sub>2</sub>, O<sub>2</sub>, ion conc, hormones, signaling & receptor pathways

signaling interactions & processing cellular information

checks the ability of cells to recognize and respond to the changes in their environment    homeostasis, immunity, repair, development

error leads to disease    cancer, autoimmunity, diabetes

### Bio-magnetic signal

weak magnetic fields

specifically brain, lung, heart    other organs also produce - but too weak - these organs work nonstop - slightly more stronger magnetic field

measurement taken in a magnetic shielded room    exclude *most* external disturbances

detector called SQUID    superconducting quantum interference device

### Bio-impedance signals

impedance = resistance

implication of weak electrical current - travel thru the cells and tissue - measure the voltage drop generated = impedance of the body

measure body composition

