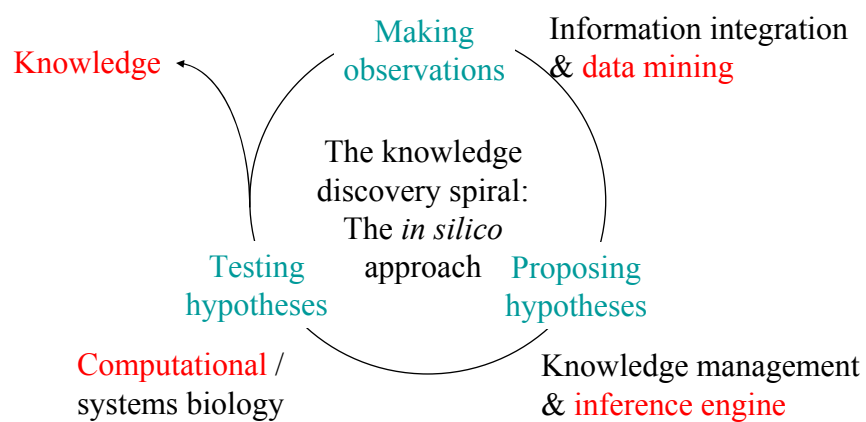


Bioinformatics and translational medicine

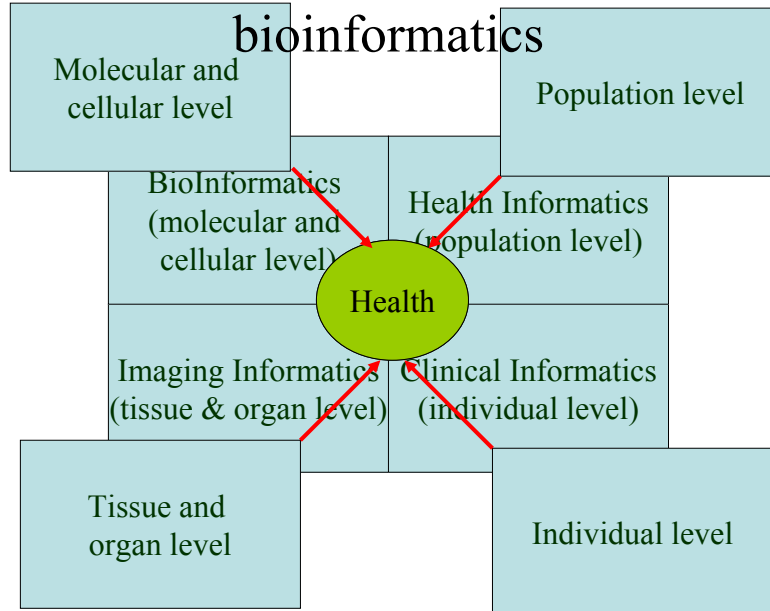
Ueng-Cheng Yang
Institute of Biomedical Informatics
National Yang-Ming University

New challenge of bioinformatics: Information-driven research



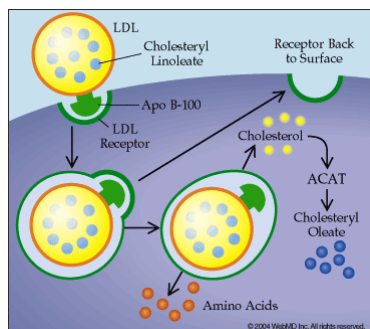
One possible application of

bioinformatics

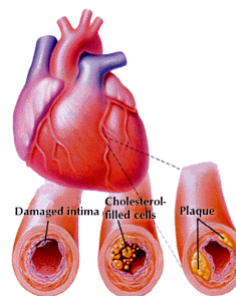


Revised from Der-Ming Liou's slide

Cholesterol metabolism and cardiovascular disease



Picture taken from <http://www.acpmedicine.com/sample/ch0902-f4.htm>



Picture taken from <http://www.sbi.org.br/sbinarede/SBINarede31/>

The rate-limiting step of a clinical research or trial

Recruiting the patient & interpreting the data

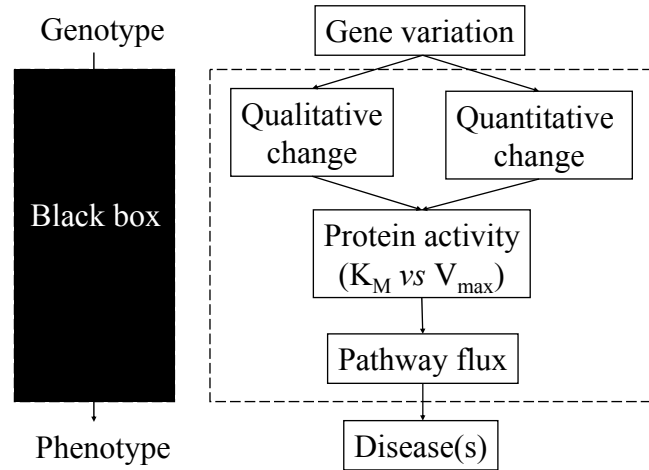
Translational medicine

- Translate the success in genomic medicine into clinical applications
- Evidence-based medicine
⇒ develop rationale and theory for drug design and therapeutic intervention
- Develop personal medicine and preventive medicine

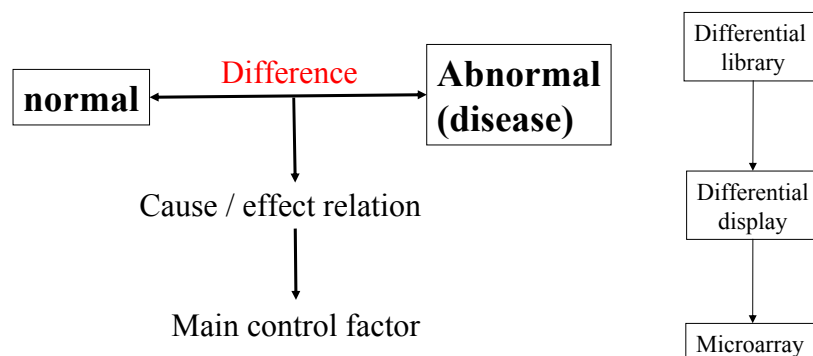
Picture taken from
<http://www.bcm.edu/tbmm/tb.html>



The detail mechanism of a disease relies on flux prediction and verification



Molecular medicine and genomic medicine



Alternative splicing and maintenance of cancer state

Putative Alternative Splicing Database ([PALS db](#))

Release 3, Web Interface Ver. 0.9.5.1

Summary	Text	OMIM	HUGO	dbSNP	SAGE	GeneCards	Ensembl	Search again!
iProClass	InterPro	Dart	CDD	PSORT	TMHMM	NetOGlyc	ma_mRNA	Homologs

Homo sapiens Fas (TNFRSF6)-associated via death domain (FADD), mRNA
Hs.86131
Hs#S1731160

nm_003824

CODING REGION: (129, 755)
(aa) 0 100 200

(nt) 0 500 1000

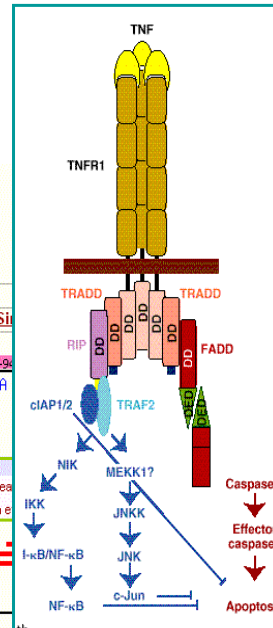
X Domain

1. death, 98-181, 1.9e-27, Death

2. DED, 3-87, 6.3e-33, Death

308 352

gb_id	seqtype	rel Ug
B6184997	SC1s	Hs.86131 *
RA164727	SC1s	Hs.86131 *
BE622088	SC1s	Hs.86131 *
R1144188	SC1s	Hs.86131 *
RA430781	SC1s	Hs.86131 *
RA433944	SC1s	Hs.86131 *



Major diseases and approaches

Genetic diseases

- Linkage analysis, assoc. Studies, etc.
- disease candidate gene predication

Cancers

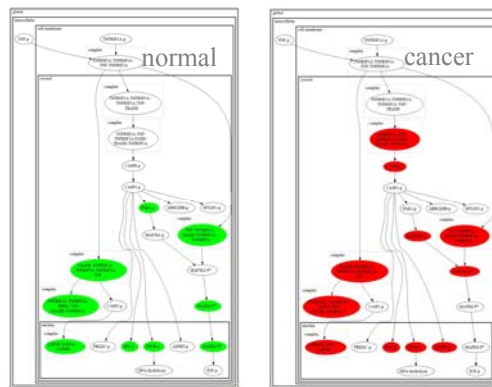
- signaling pathways
- diagnosis by microarray data analysis

Metabolic diseases

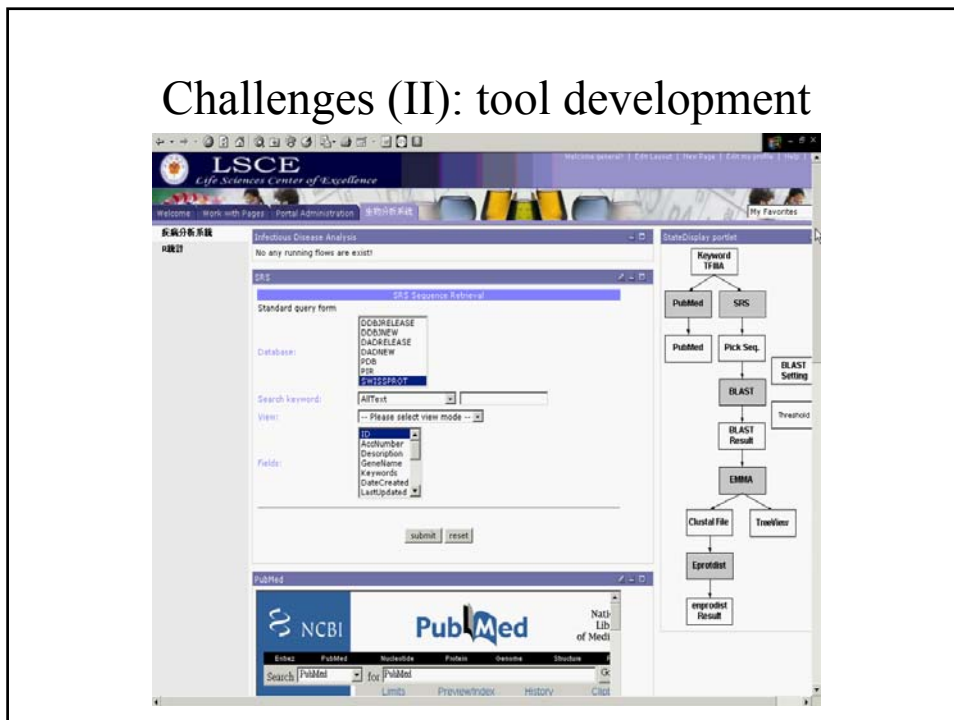
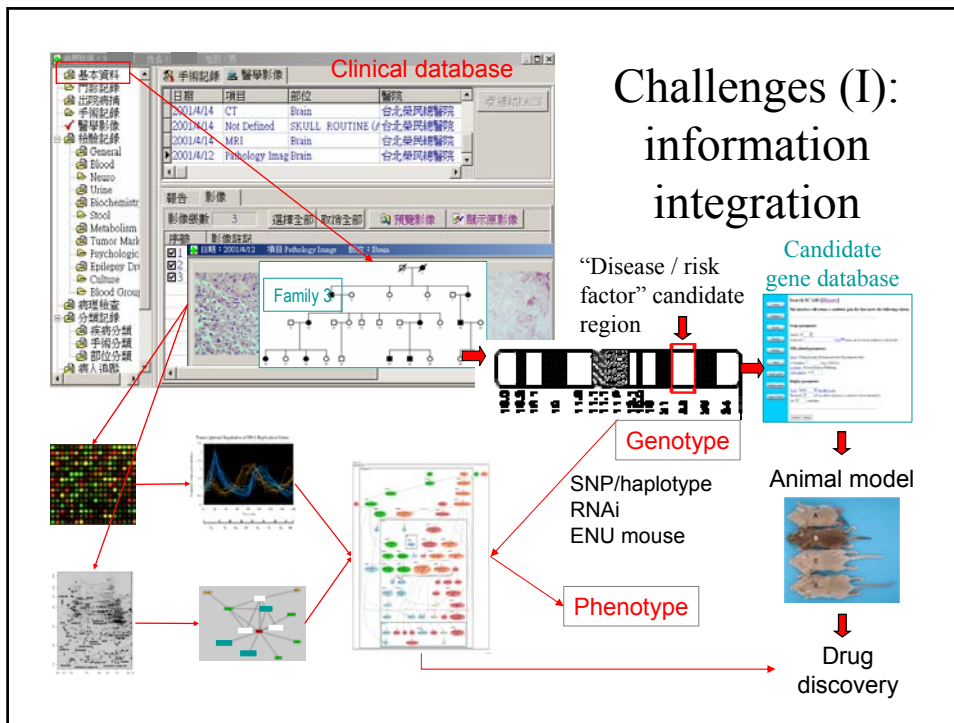
- metabolic pathways

Infectious diseases

- information collection
- comparative bioinformatics



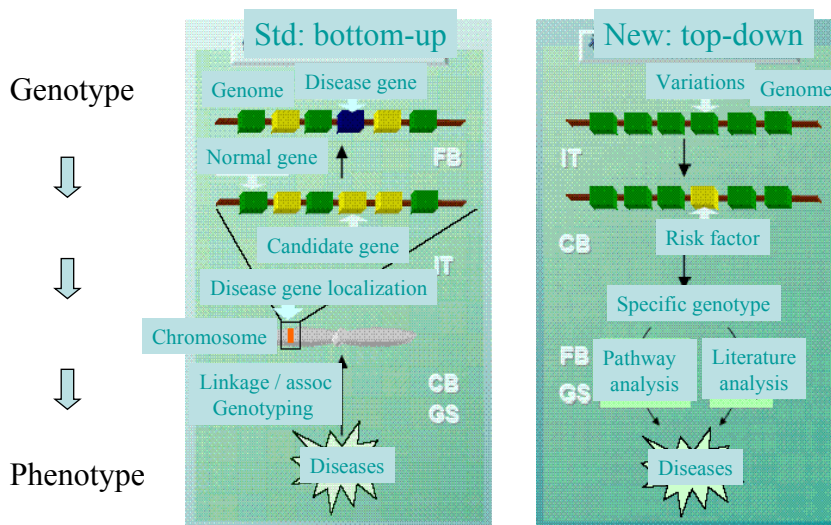
TNF pathway in lung



Example: Integration of epidemiology data with sequence data

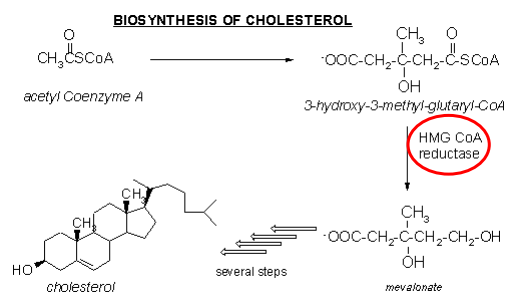
The screenshot displays the Taiwan Pathogenic Micro-organism Genome Database (TPMGD) search interface. The main search form includes various filters such as Barcode, Sex, Residence, Date, and others. An inset window on the right shows a phylogenetic tree with sequence identifiers like 001183 A.A., 001192 A.A., etc.

Future: Preventive medicine and personal medicine



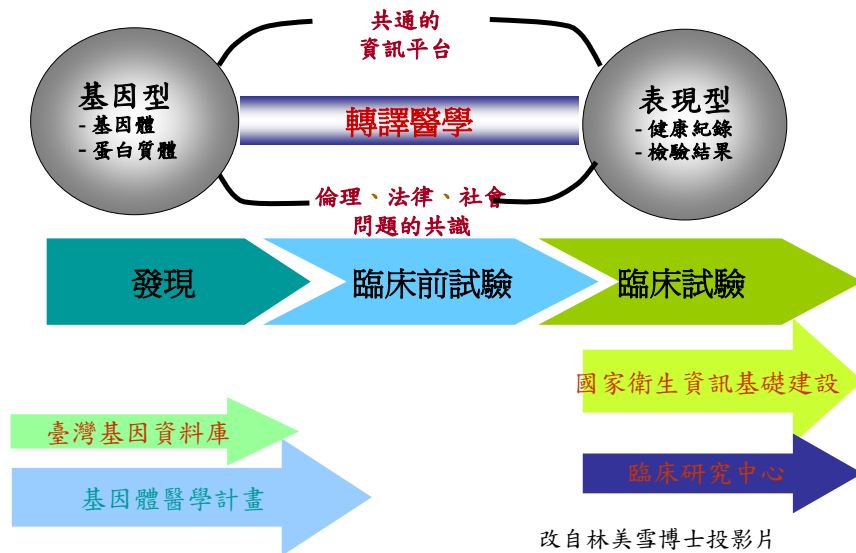
The end

Competitive inhibitor of cholesterol biosynthesis



Picture taken from
<http://www.people.vcu.edu/~urdesai/intro.htm>

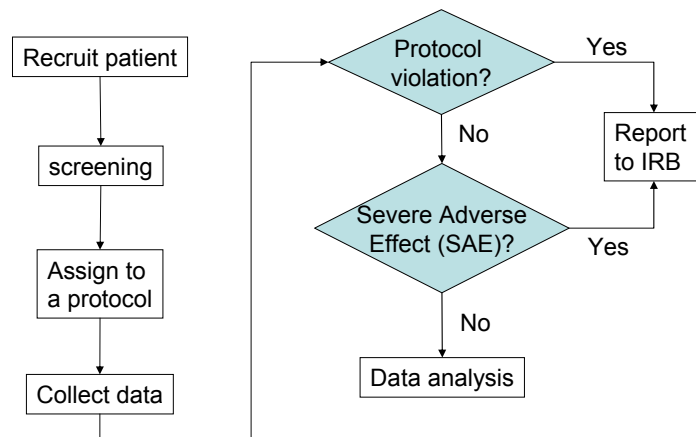
國內的生醫發展策略



Clinical research vs clinical trial

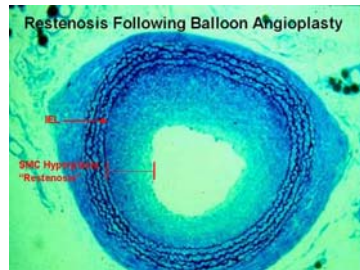
Trial will observe the difference
between treated and nontreated

How to conduct a clinical research / trial?

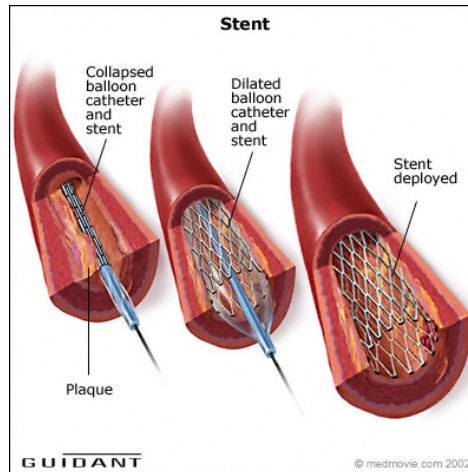


Example: taxol coated stent

Use stent to improve restenosis

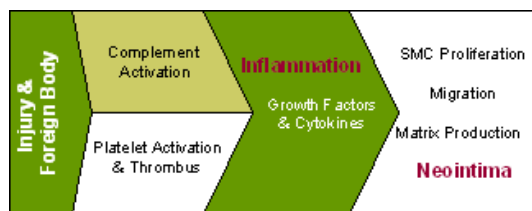


Picture taken from <http://www.tufts.edu/sackler/cmdb/castellot-lab-fig2.htm>

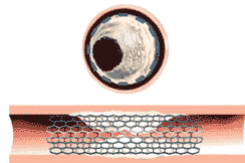


Picture taken from <http://www.guidant.com/condition/images/030Stent.jpg>

Instent restenosis

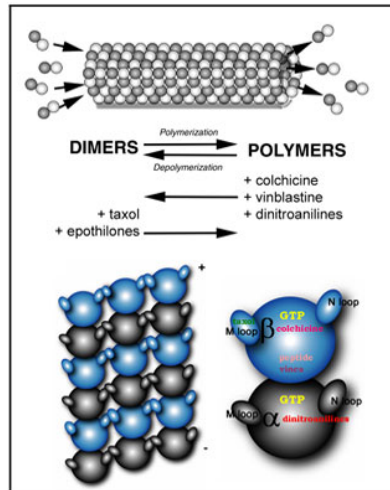


* SMC = arterial smooth muscle cells
<http://www.allvivo.com/technology2.gif>

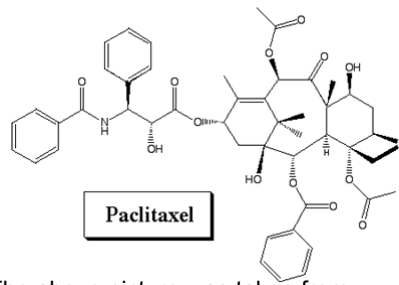


Picture taken from http://www.mplsheart.com/graphics/artery_images/Instent_restenosis.gif

New hypothesis: microtubule will stop the SMC proliferation



<http://morrissettelab.bio.uci.edu/research%20in%20our%20lab%20FINAL.html>



The above picture was taken from <http://biotech.icmb.utexas.edu/botany/tax.html>

Genome-Wide Association Study

