Requirement of animal experimentation for drug discovery

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Importance of animals in drug discovery

There is practically no drug available

in the market which came out without

animal experimentation

Drug discovery – Its necessity

1. For our country drug discovery is a compulsion.

2. Majority of our available drugs are from foreign pharma companies.

3. This has not only created our dependence on foreign pharma companies but also produces adverse effect on our economy.
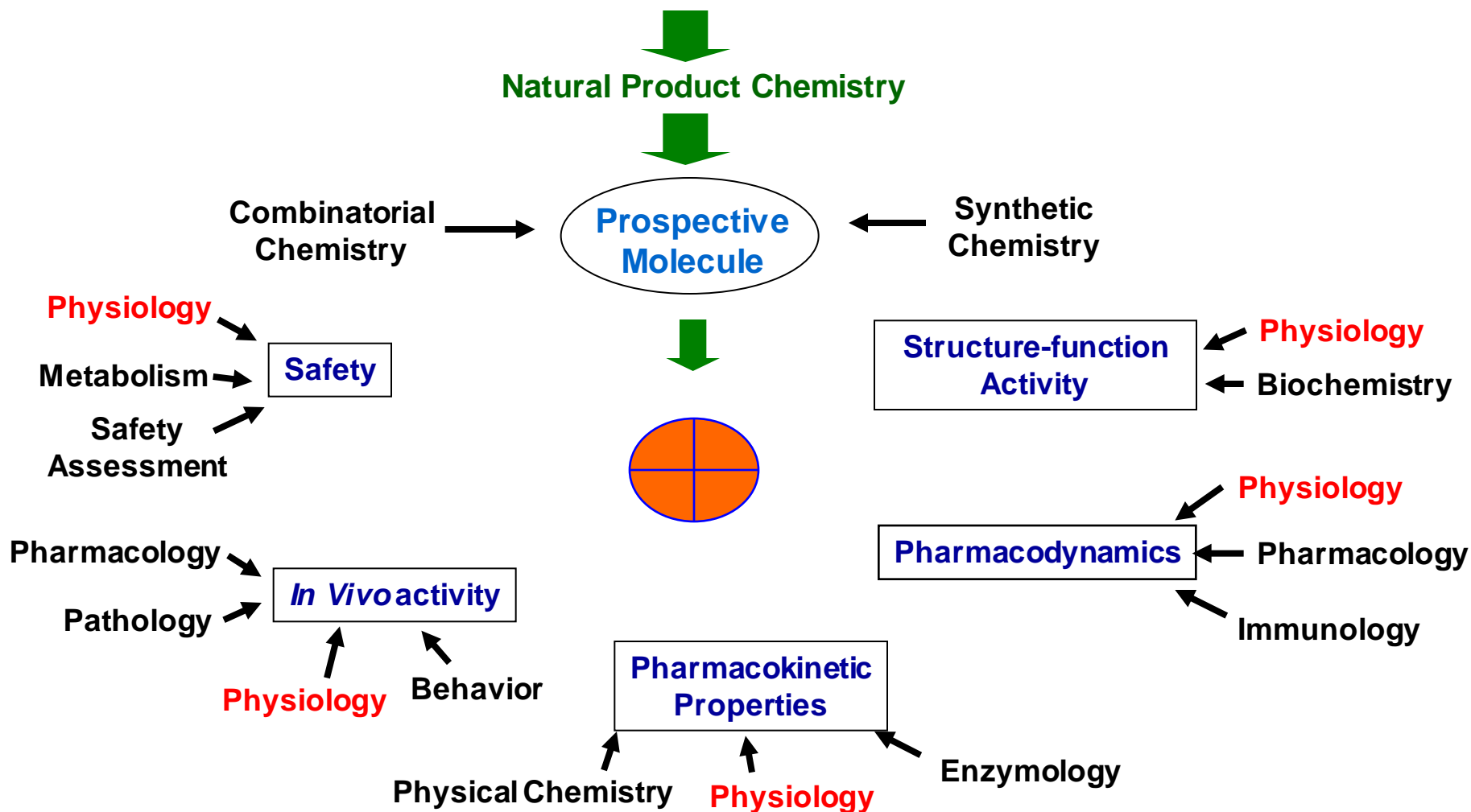
Animal experiments – An obligation

1. On one hand we are emphasizing the need for drug discovery and on the other animal experimentation is being opposed ---- this is a glaring contradictory situation.

2. To discover and developed a drug, experiments on efficacy and toxicity are essential.

3. Let us know about the essentiality of animal experiments for drug discovery.

Drug Discovery – Importance of Animal Testing

India's rich natural resource

Natural Product Chemistry

Combinatorial Chemistry → **Prospective Molecule** ← **Synthetic Chemistry**

Physiology → **Safety**
Metabolism → **Safety**
Safety Assessment → **Safety**

Structure-function Activity ← **Physiology**
Structure-function Activity ← **Biochemistry**

Pharmacology → **In Vivo activity**
Pathology → **In Vivo activity**
Physiology → **In Vivo activity** ← **Behavior**

Pharmacodynamics ← **Physiology**
Pharmacodynamics ← **Pharmacology**
Pharmacodynamics ← **Immunology**

Pharmacokinetic Properties
Physical Chemistry → **Physiology** → **Enzymology**

What animals we use and why we use them

1. More than 90% of animals used for drug research are rats and mice as they represent mammalian group. They are available through laboratory breeding facilities.

2. Only 1-2% drug research is conducted with large animals that includes dogs, cats and primates. The scientific reasons behind using them are –

   (a) Our cardiovascular system is closely similar to dogs,

   (b) Nervous system of cats resembles to that of human.

   (c) 95% of our genes are similar to apes.

Benefits availed due to animal experimentation

A medicine, Accutane/Roaccutan, has been used to treat skin diseases. During animal testing, it was found to cause birth defects and for this reason doctors never prescribed this drug to pregnant women.

Many cytostatic drugs, developed for dealing with the cancer, are found to be highly toxic in animal testing system.
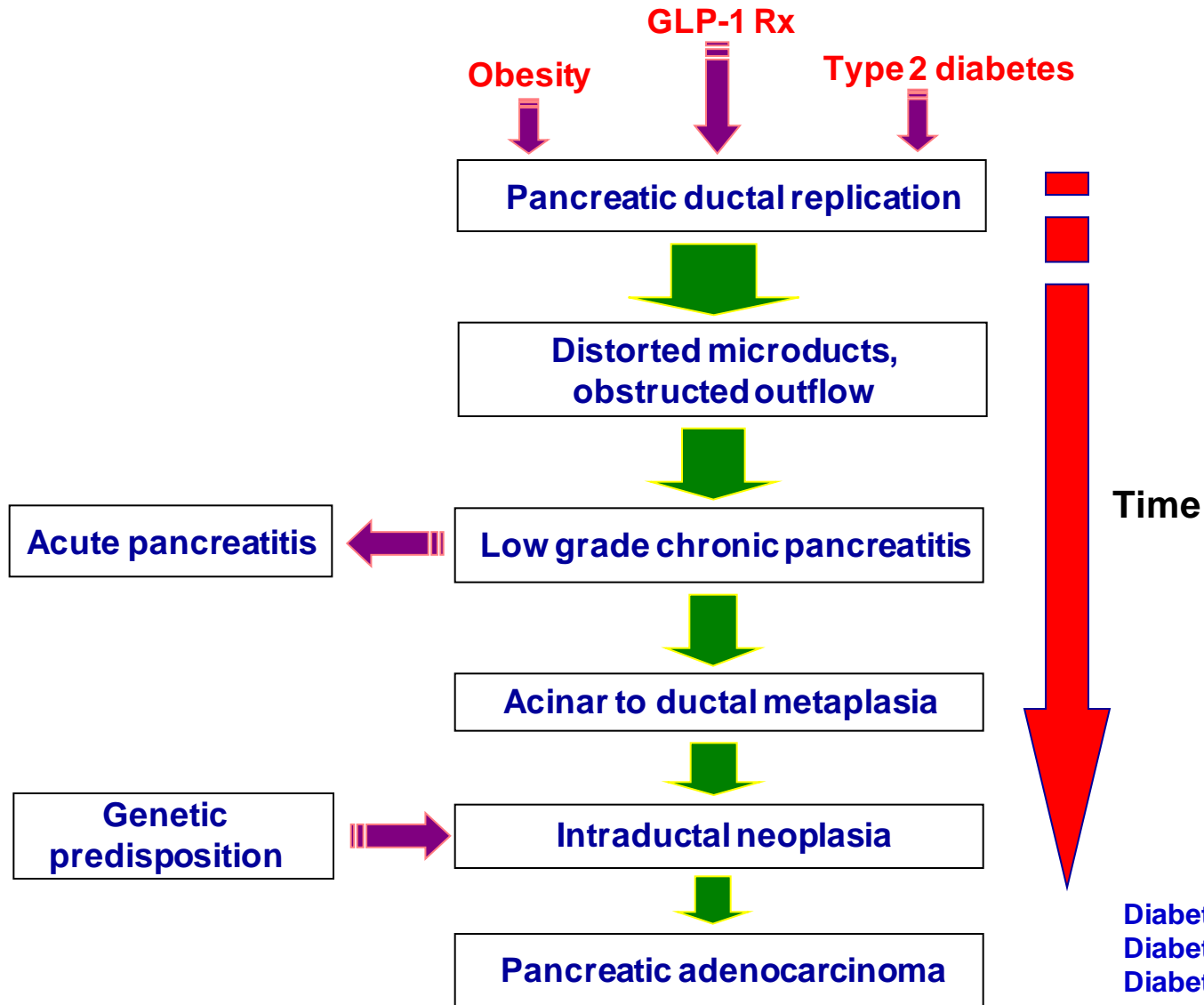
30-40% of drugs are found to be unsuitable at their advanced stage of development due to potential toxicity and high risk for human life. This clearly elucidates the importance of animal testing.

Failure of drugs due to insufficient animal research program

The most important example is with Thiazolidinediones (TZD) classes of drugs, Rosiglitazone. Use of this drug has been found to be associated with risk of cardiovascular events like congestive heart failure and Myocardial Infarction. Another TZD, Pioglitazone, has very recently reported to induce bladder cancer and osteoporosis in long term treatment.

European Medicines Agency on 23 September, 2010, recommended the suspension of the marketing authorisations for the Rosiglitazone — anti-diabetes medicines. India has finally banned the much controversial drug "Rosiglitazone" prescribed for Type-2 Diabetes.

Failure of drugs due to insufficient animal research program

Obesity

GLP-1 Rx

Type 2 diabetes

Pancreatic ductal replication

Distorted microducts, obstructed outflow

Acute pancreatitis ← **Low grade chronic pancreatitis**

Acinar to ductal metaplasia

Genetic predisposition → **Intraductal neoplasia**

Pancreatic adenocarcinoma

Time

Diabetes Care 2010, 33: 453-455
Diabetes 2010, 59: 1129-1131
Diabetologia 2010, 53:1-6

We lost our valuable natural resource products due to lack of research drive for drug discovery

Curcumin from Haldi (*Curcumin longa*) is an excellent anti-cancer compound with which human trials have progressing at NIH. Curcumin is now a property of America.

Similarly, we will lose many others if drug discovery in our country is not given a serious attention along with the animal test facility.

Our dependence for drug will not only cause economic loss but the irony of fate is our valuable natural resource materials of potential drug candidate will be the property of other countries and we will buy them paying a high price, rendering them unaffordable for many severely suffering common people of our country.