Transgenic Animal Use

Doç. Dr. Pınar YILGÖR HURİ

BME 262 Biomedical Engineering Ethics
Ankara University
Department of Biomedical Engineering

Advantages

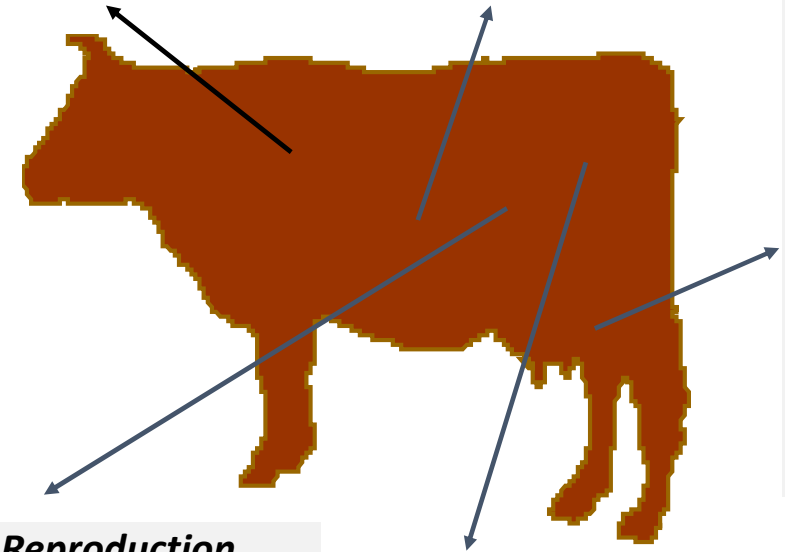
- *Ability to develop disease models that cannot be created by any induction technique*

- *Ability to solve the genetic background that plays a role in the etiopathogenesis of diseases*

What is a Transgenic Animal ?

- *Using recombinant DNA technology, a foreign DNA is placed in the genome.*
- *Modified genetic structure is transported in all cells, including the germ cells of the transgenic animal.*
- *Laboratory mice are widely used in studies with transgenic animals.*

Applications of Genetic Engineering in Transgenic Field



Resistant to Diseases

High Fattening Performance

Milk Production

Increased milk volume

Changing the chemical structure of milk

Increased nutrition and digestibility

Production of therapeutic proteins and vaccines

High Reproduction Capacity

Modification of muscles

Transgenic Studies in Fish

- *Transgenic β-actin promoter GH gene*
- *Growth up 30 times*

14 month transgenic = 41.8 cm
6 month transgenic = 255.4 g

Knock-in

- *Targeting the transgene to a specific region by homologous recombination*

Knock-out

- *Elimination of a functional domain of the gene or protein*

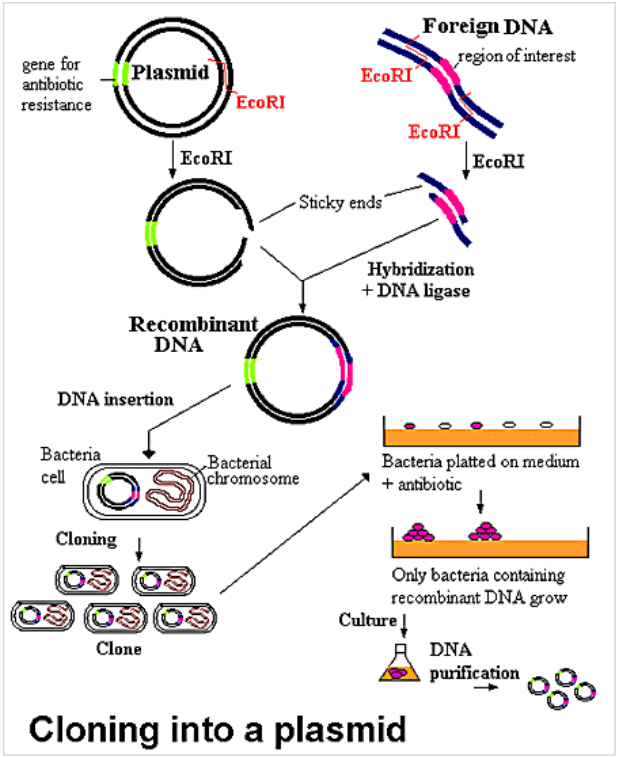
Gene Transfer Methods

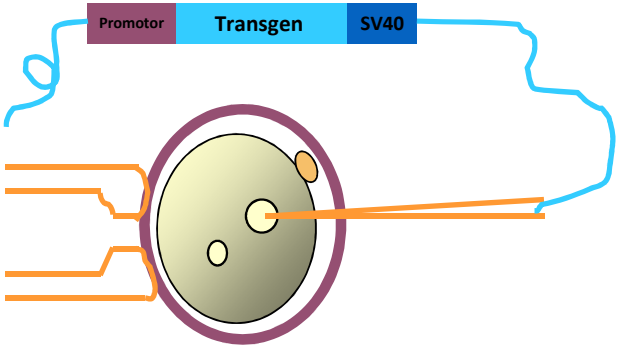
- *Chemical and Other Techniques*
  - *Calcium Phosphate Method*
  - *Dietilaminoetil-Dextran Method*
  - *Direct gene injection into testes*
  - *Gene transmission via sperm*
  - *Fusion techniques*
  - *Liposomes, PEG*
- *Viral Techniques*
  - *Retroviruses*
  - *Lentiviruses*
- *Physical Techniques*
  - *Pronuclear DNA Microinjection*
  - *Embryonic stem cell gene transfer (elektroporation)*
  - *Nuclear transfer (Cloning)*

Transgenic Mouse Production Process

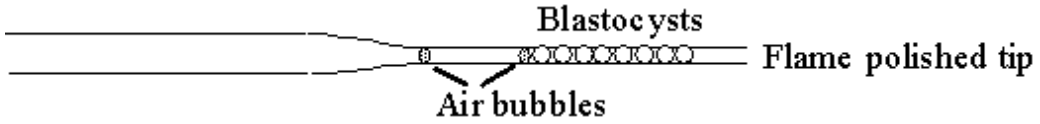
- *Preparation of the transgene construct,*
- *Embryo production with superovulation,*
- *Pn-DNA microinjection and embryo culture*
- *Preparation of receiving mother and embryo transfer,*
- *Detection of transgenic mice*

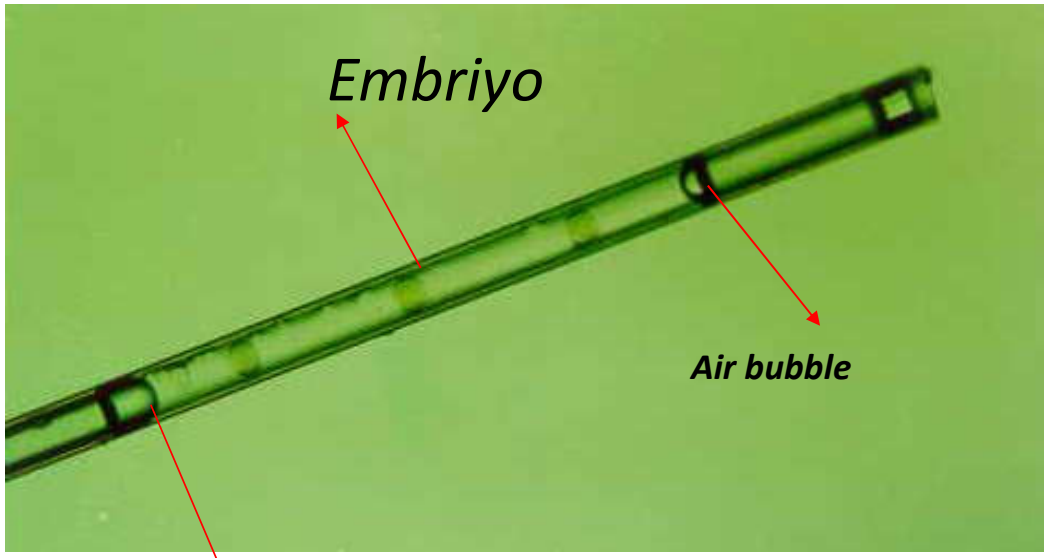
  (gDNA, PCR, Shouthern blot vs.),
- *Production of homozygous line*



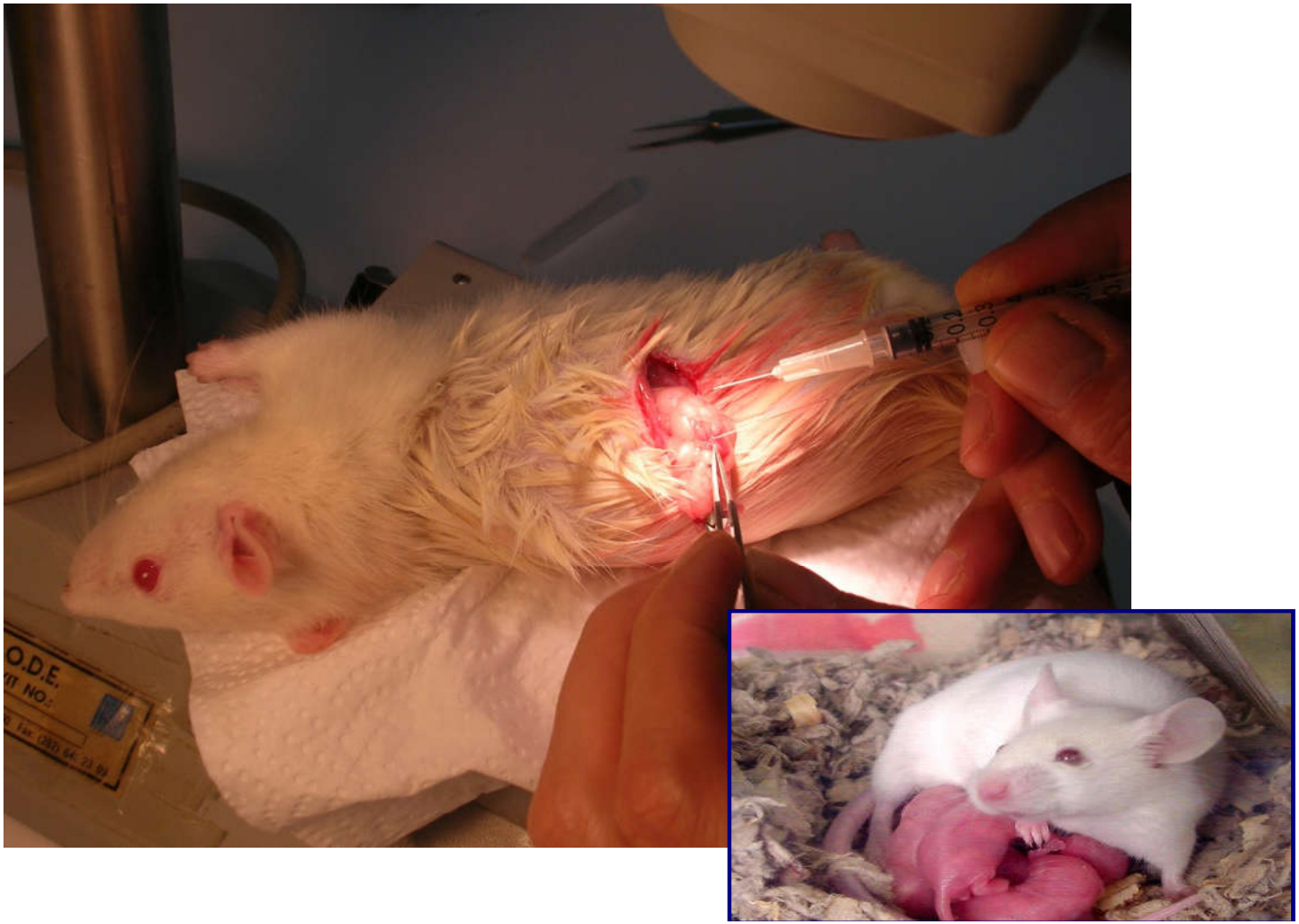


Embryo Transfer

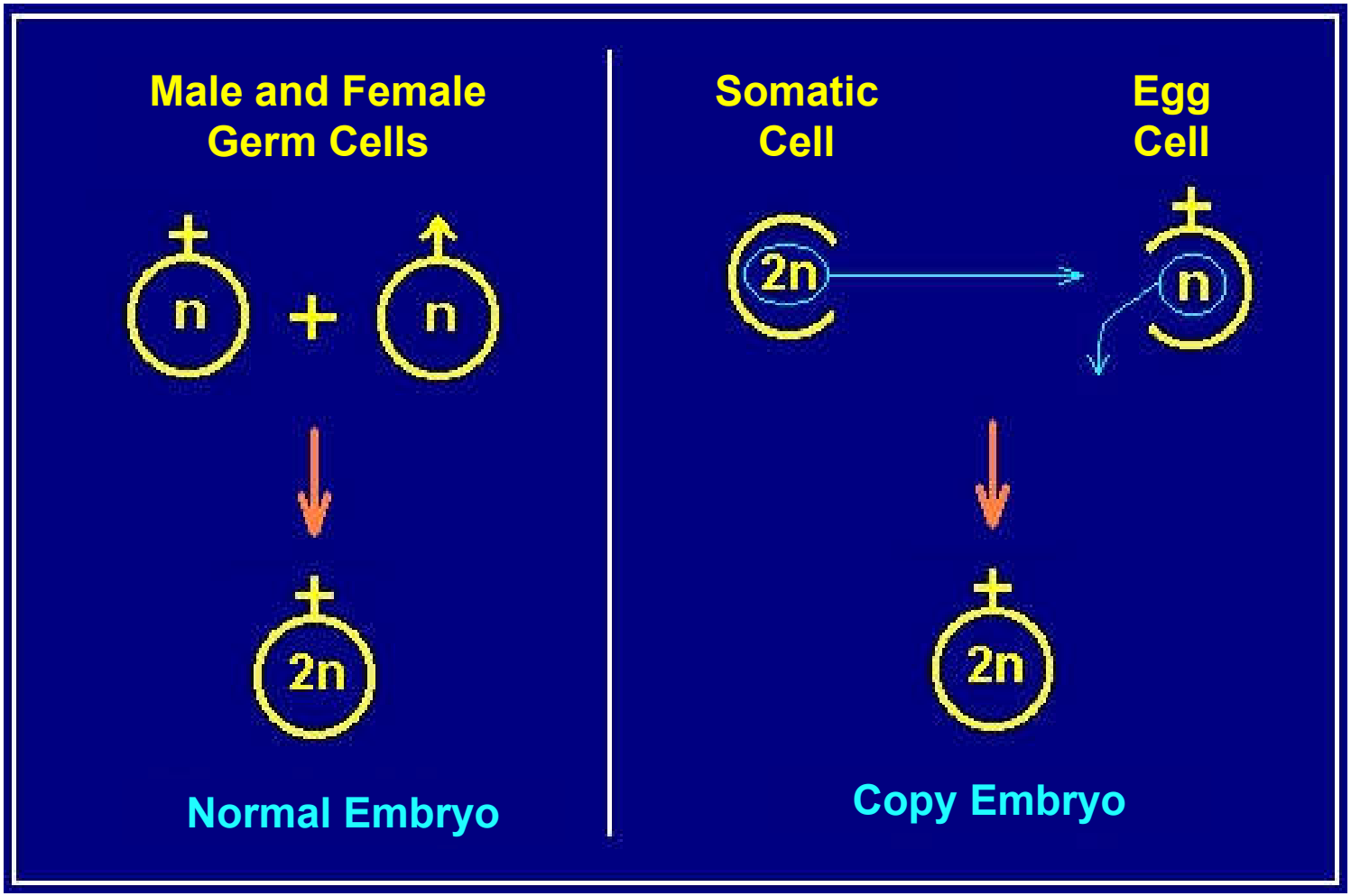




Embryo Transfer

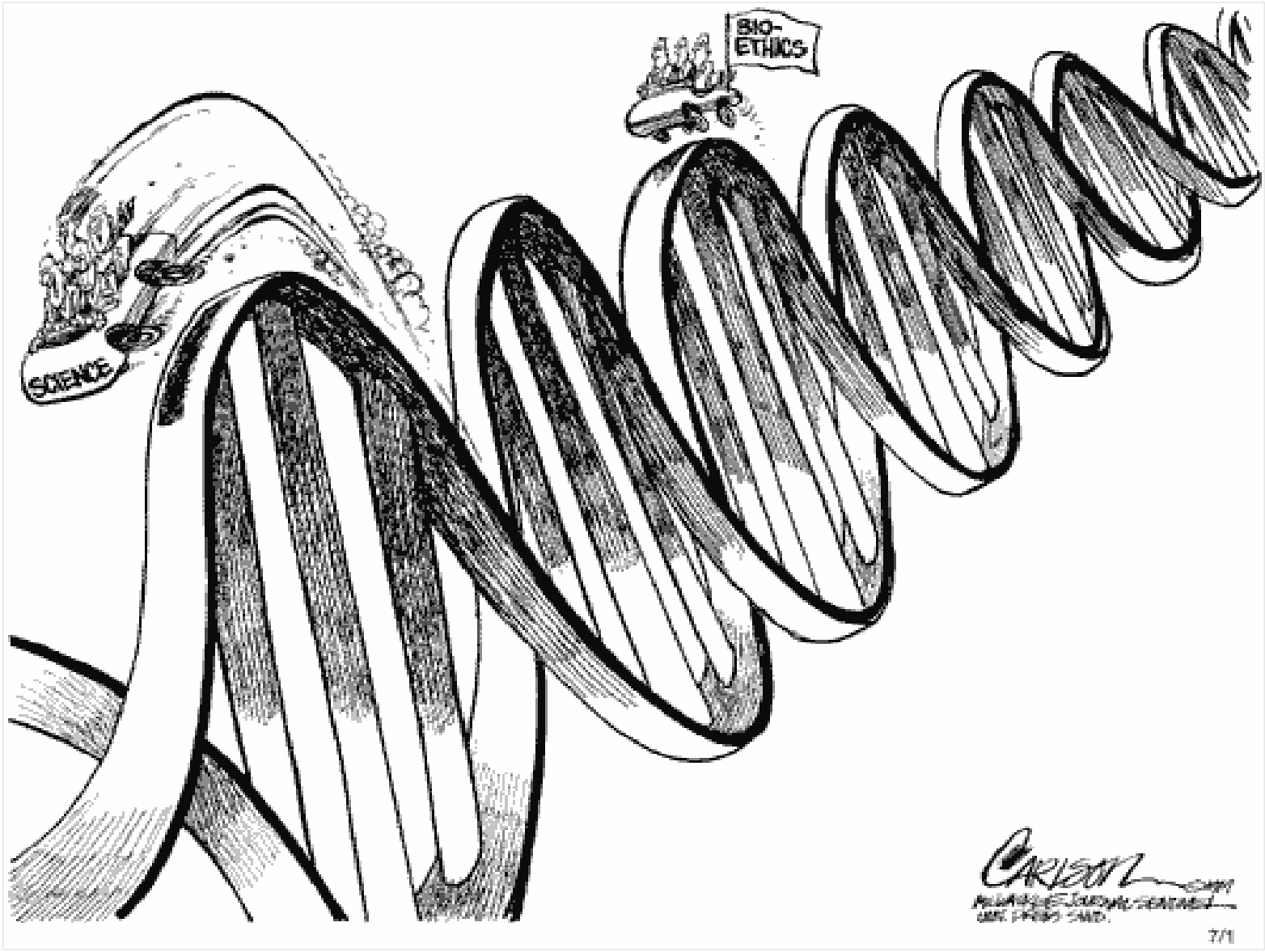


Sexual and Asexual Reproduction



Application Areas of Cloning

- *Farming*
  - *Cloning of disease-resistant animals*
- *Biofarming*
- *Disease models*
- *Organ sources*
- *Animals in danger of extinction*
- *Therapeutic cloning (for organ damage)*


BIO-
ETHICS
SCIENCE