

## **IGF-1 bioavailability in tissues determines body size**

Sébastien Elis, Yingjie Wu, Hayden-William Courtland, Hui Sun, Valerie Williams, Karl Jepsen, Shoshana Yakar

► **To cite this version:**

Sébastien Elis, Yingjie Wu, Hayden-William Courtland, Hui Sun, Valerie Williams, et al.. IGF-1 bioavailability in tissues determines body size. 91. Annual Conference on endocrine System Diseases, Jun 2009, Washington, United States. 2009, 91st Annual Conference on Endocrine System Diseases (Endo 2009). hal-02758107

**HAL Id: hal-02758107**

**<https://hal.inrae.fr/hal-02758107>**

Submitted on 4 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.





MOUNT SINAI  
SCHOOL OF  
MEDICINE

# IGF-1 Bioavailability in Tissues Determines Body Size

Sebastien Elis, Yingjie Wu, Hayden-William Courtland, Hui Sun, Valerie Williams, Karl Jepsen and Shoshana Yakar

Division of Endocrinology, Diabetes and Bone disease, Mount Sinai School of Medicine, New York, NY 10029



MOUNT SINAI  
SCHOOL OF  
MEDICINE

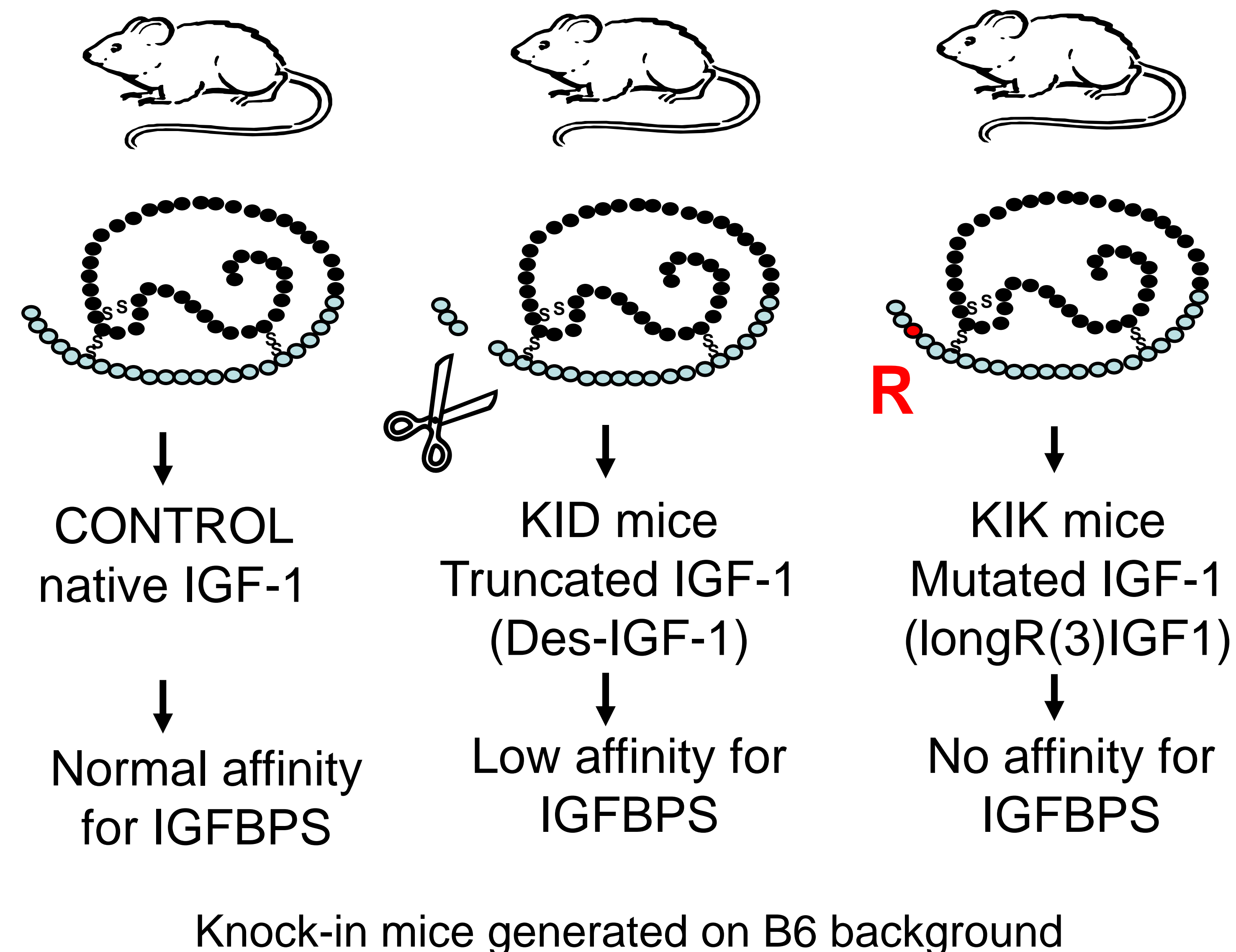
## BACKGROUND

IGF-1 is an important regulator of somatic growth and body size. IGF-1 forms complexes with a family of high affinity IGF-binding proteins (IGFBPs) that protect it from proteolytic degradation in serum and regulate its bioavailability. The IGF-1 analog des-IGF-1 has a three amino acid truncation at its N-terminus, which significantly decreases its binding affinity to the IGFBPs, but does not affect its affinity for the IGF-1 receptor. The Long R IGF-1 analog (LR3) has one amino acid substitution at position 3 (glu>arg), which significantly reduces its affinity to IGFBPs.

## AIM

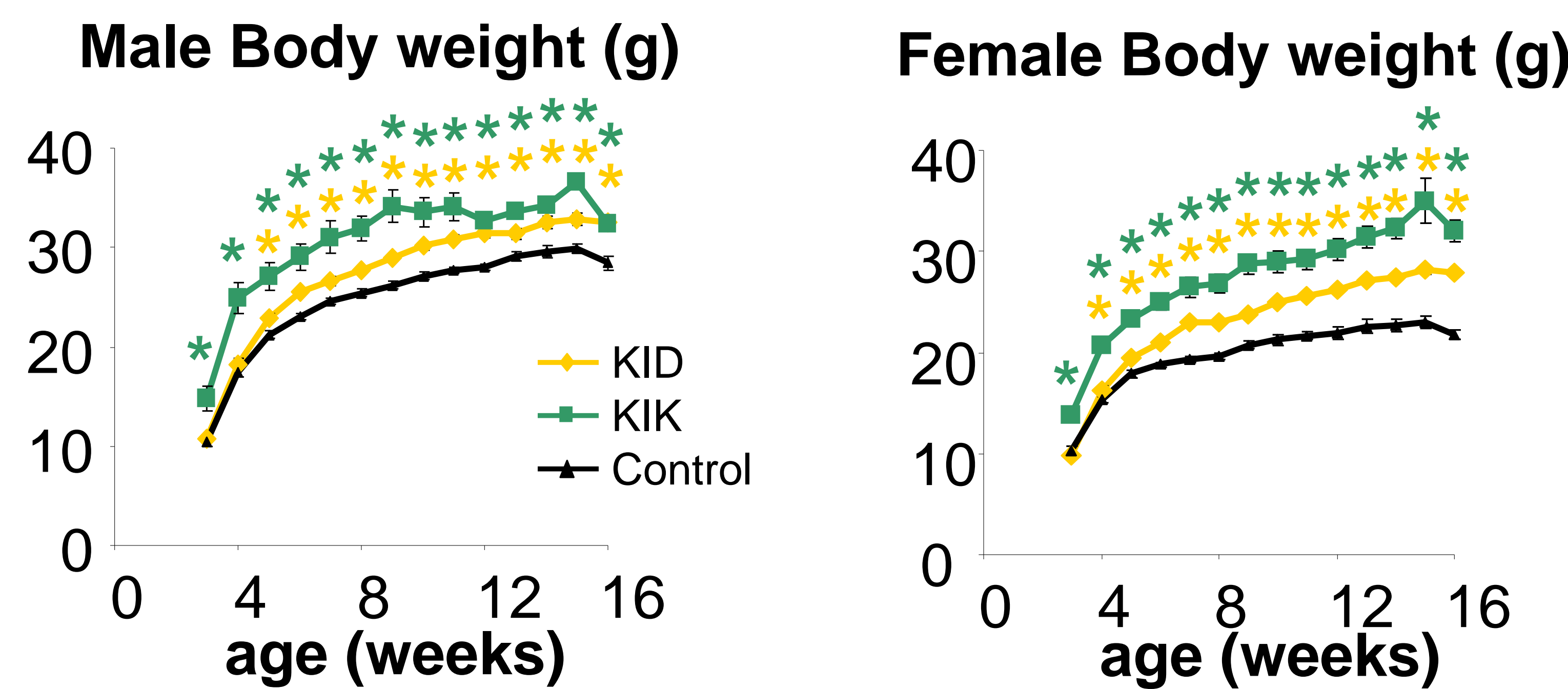
Determine whether IGF-1 binding to IGFBPs is both necessary and sufficient for regulation of somatic growth

## Knock-In Mouse Models

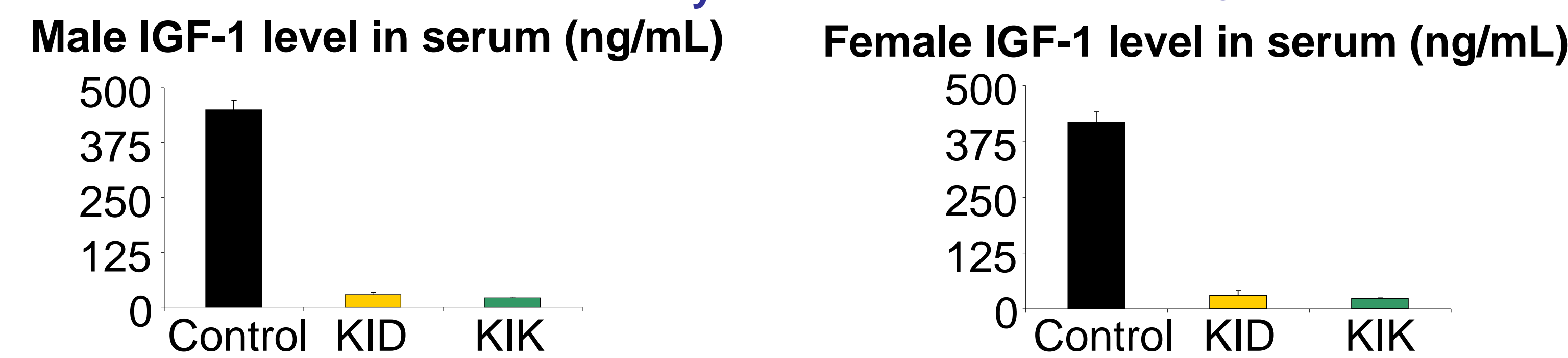


## RESULTS

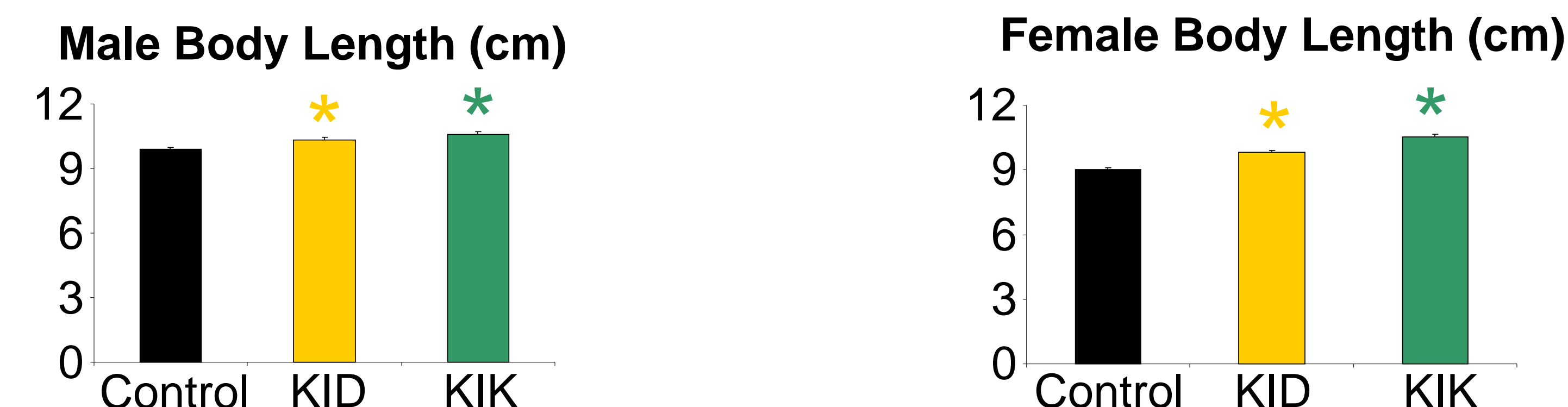
### Free IGF-1 in tissues leads to increased body weight



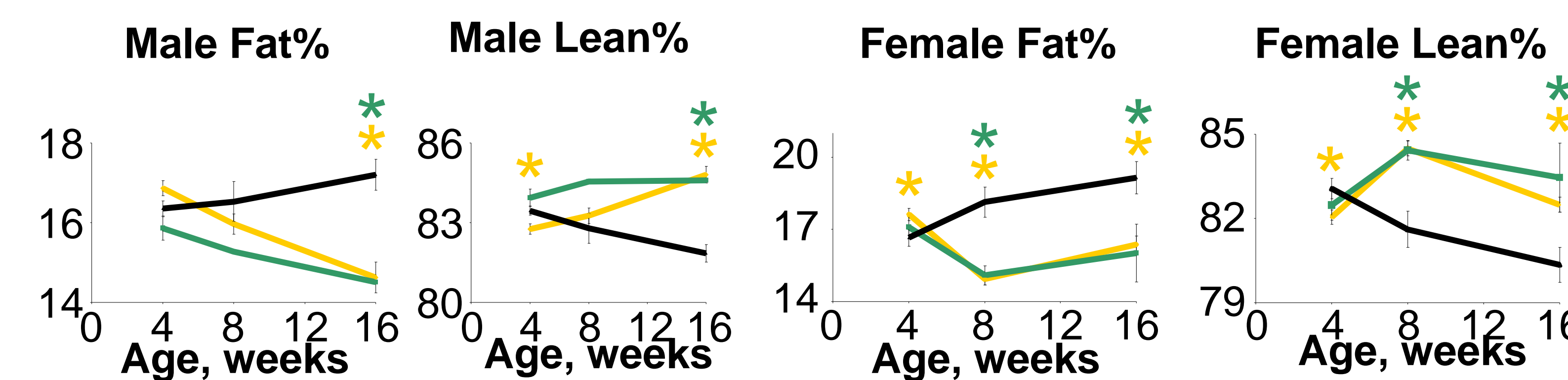
### Knock-in mice show nearly undetectable levels of IGF-1 in serum



### Free IGF-1 increases body length

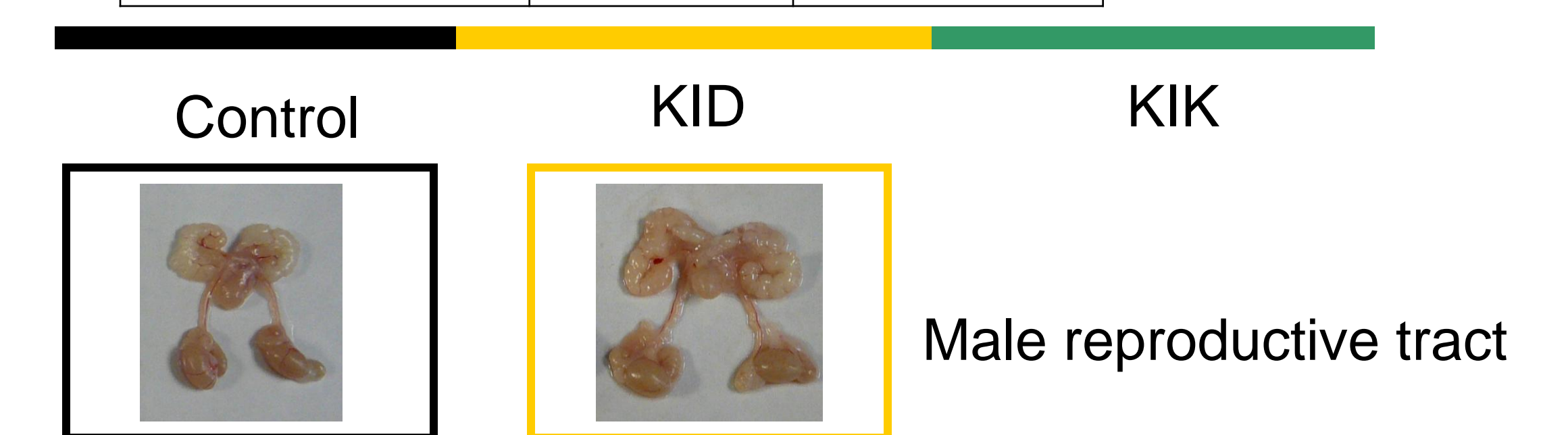


### Free IGF-1 increases lean mass and decreases fat mass

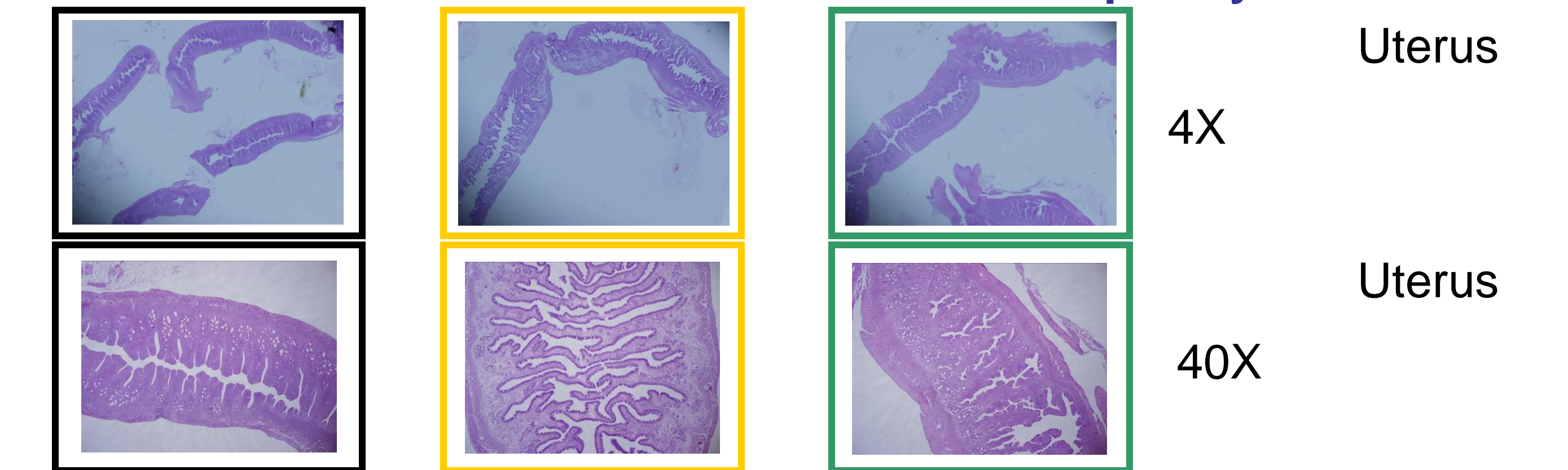


### Organ Weight to Body Weight Ratios for Mouse Models

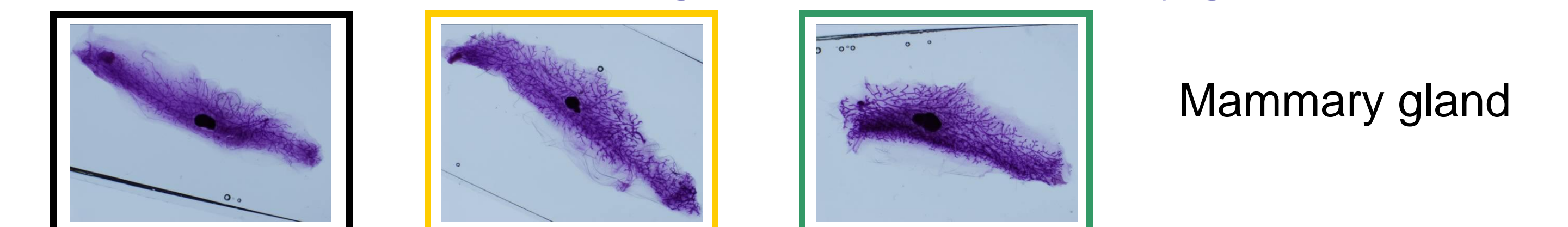
Sex	Model	Gonadal fat	Pancreas	Uterus and Ovaries
Female	KID	0.73	0.95	1.17
	KIK	0.66	0.82	1.14
	Control	1.31	0.61	0.78
Male	Model	Gonadal fat	Pancreas	16w organs
	KID	0.78	0.89	
	KIK	0.89	0.77	
	Control	1.41	0.59	



### Free IGF-1 leads to increased uterine size and complexity



### Free IGF-1 leads to increased branching within the mammary gland



## CONCLUSIONS

Loss of IGFBP binding increases body size and organ size in both males and females, likely through increased IGF-1 bioavailability. Further studies are needed to determine how changes in IGF-1 bioavailability affect skeletal growth, carbohydrate metabolism and tumor susceptibility.

## GRANTS

National Institute of Health : R01AR055141- R01AR054919