October 2024

H.C. Wainwright 8th Annual MASH Investor Conference

LIPOCINE®
ENHANCING HEALTH

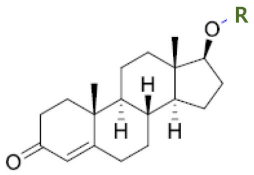
Forward-Looking Statements

This presentation contains "forward-looking statements" that are made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and include statements that are not historical facts regarding our product development efforts, our strategic plans for developing product candidates, our ability to monetize product candidates, including through entering into partnering arrangements, the application of our proprietary platform in developing new treatments, our product candidates and related clinical trials, the achievement of milestones within and completion of clinical trials, the timing and completion of regulatory reviews, outcomes of clinical trials of our product candidates, and the potential uses and benefits of our product candidates. Investors are cautioned that all such forward-looking statements involve risks and uncertainties, including, without limitation, the risks that we may not be successful in developing product candidates, we may not have sufficient capital to complete the development processes for our product candidates, we may not be able to enter into partnerships or other strategic relationships to monetize our assets, the FDA will not approve any of our products, risks related to our products, expected product benefits not being realized, clinical and regulatory expectations and plans not being realized, new regulatory developments and requirements, risks related to the FDA approval process including the receipt of regulatory approvals and our ability to utilize a streamlined approval pathway for LPCN 1154, the results and timing of clinical trials, patient acceptance of Lipocine's products, the manufacturing and commercialization of Lipocine's products, and other risks detailed in Lipocine's filings with the SEC, including, without limitation, its Form 10-K and other reports on Forms 8-K and 10-Q, all of which can be obtained on the SEC website at www.sec.gov. Lipocine assumes no obligation to update or revise publicly any forward-looking statements contained in this presentation, except as required by law.

Lipocine - Enabling Effective Oral Delivery

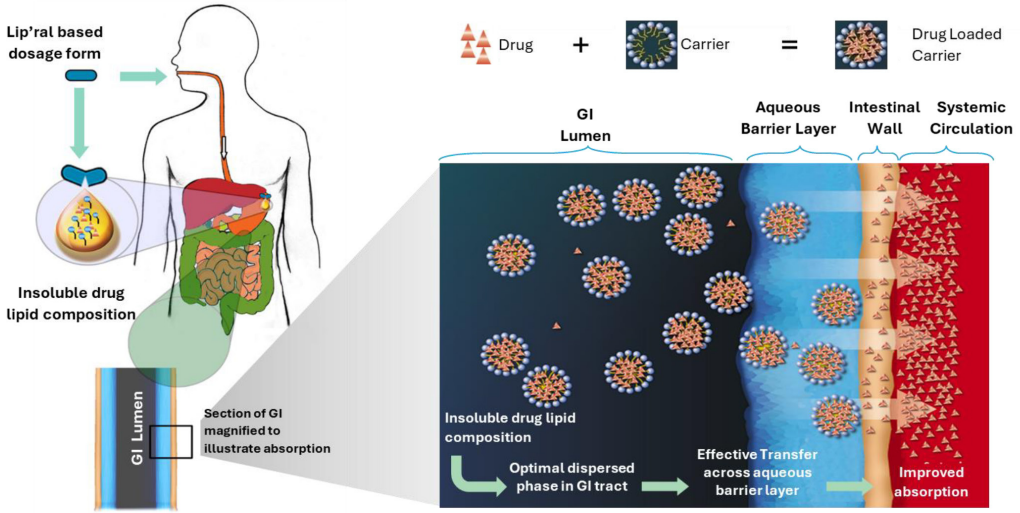
The Lip'ral platform optimizes GI absorption for faster onset of efficacy

Testosterone Esters



Testosterone Esters

Highly lipophilic with Logp > 8



Giliyar et al. Drug Delivery Technology, Jan 2006, Vol 6 No.1

Lip'ral enables development of superior oral products

- Improved Solubilization and High Drug-Loading Capacity
- Improved Bioavailability
- Faster and More Consistent Absorption
- Improved Patient Compliance

LiFT (Liver Fat Intervention with oral Testosterone)*†

Phase 2 paired biopsy study in men with MASH (NCT04134091)

Study Design

- Biopsy confirmed male MASH subjects with F1-F3
  Three-arm, blinded, placebo-controlled
- Hypogonadal and eugonadal men enrolled
- 1:1:1 randomization
  - TU mono - Oral TU monotherapy
  - TU combo - Oral TU + d-alpha tocopherol
  - Matching placebo
- Treatment duration of 36 weeks

Primary Endpoint

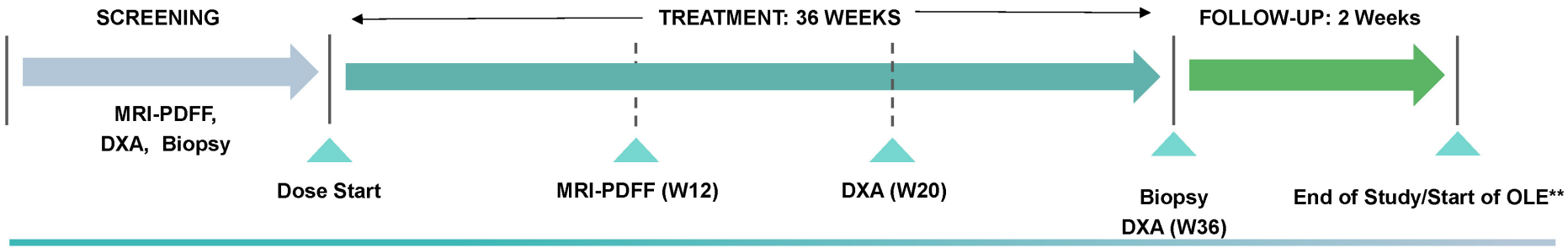
- ✓ Change in hepatic fat fraction via MRI-PDFF (W12)

Key Secondary Endpoints

- ✓ NASH resolution without worsening of fibrosis (CRN scoring, W36)
- ✓ Change in liver injury markers

Analysis Sets

- Safety Set: All randomized subjects (ITT)
- NASH Resolution Set: Biopsy set with NAS ≥ 4 and at least 1 point in both inflammation and ballooning



LIPOCINE ENHANCING HEALTH

* Website: www.lift-study.com
** Open Label Extension Study (36 weeks)
† Study was not powered to show statistical significance of secondary endpoints

LiFT Study

Baseline characteristics

Safety Analysis Set[1]

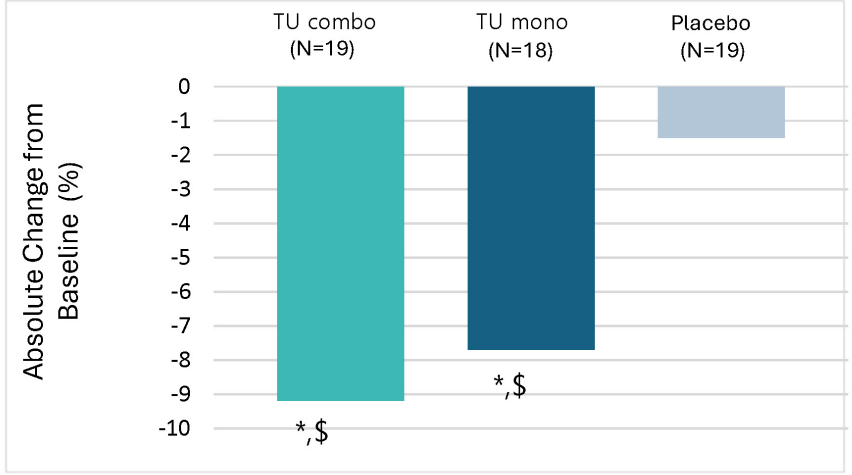
Parameter at Baseline	TU mono (N=18)	TU combo (N=19)	Placebo (N=19)
Mean Age (years)	51.3	53.4	53.6
Mean BMI (kg/m^2)	36.9	34.5	37.3
Diabetes (%)	72.2	57.9	52.6
Hypertension (%)	66.7	57.9	68.4
Mean NAFLD Activity Score	4.9	4.8	4.7

[1]Safety set
NASH CRN scoring for NAFLD Activity Score

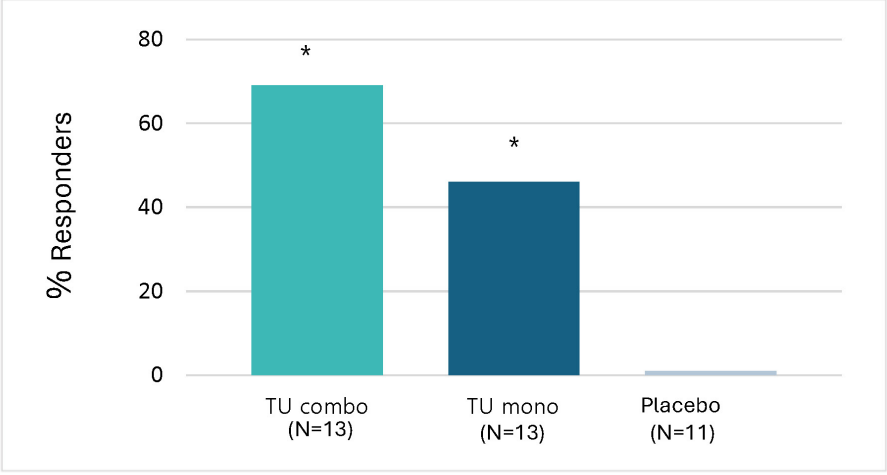
Improvement in Liver Health

LPCN 1144 - primary endpoint met

Liver Fat Reduction at Week 12 (MRI-PDFF)[1]



NASH Resolution with No Worsening of Fibrosis[2]

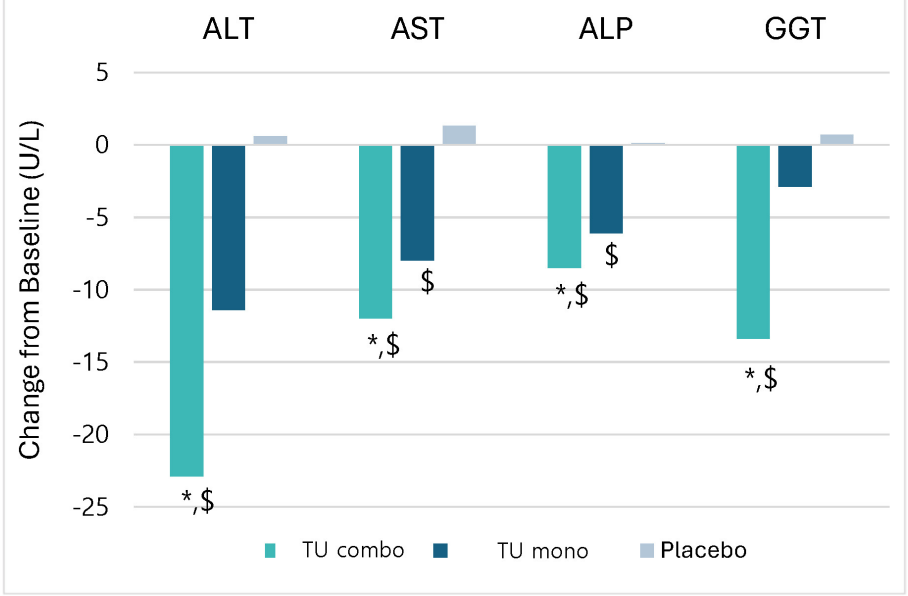


1. All Subjects: ITT Dataset, n = 56, missing data imputed using multiple imputation. * p < 0.05; vs placebo; $ p < 0.05 vs baseline.
2. NASH resolution is defined per FDA guidance. NASH Resolution Set includes those subjects with baseline and EOS biopsy and with NASH at baseline per FDA Phase 3 guidance. * p < 0.05; vs placebo

Improvement in Liver Health

LPCN 1144 therapy demonstrated an improvement in liver injury markers

Liver Injury Marker Reduction[1]



1. Safety set. * p < 0.05; vs placebo; $ p < 0.05 vs baseline.
2. All Subjects: ITT Dataset, n = 56, missing data imputed using multiple imputation. * p < 0.05; vs placebo; † p < 0.05 vs baseline.

Safety profile

Well-tolerated with no safety signals with up to 72-week exposure

- Frequency and severity of TEAEs, SAEs with TU arms were comparable to placebo
  - 4 subjects discontinued in placebo due to TEAEs vs. 1 subject total in combined TU treatment arms
- GI adverse events (diarrhea, nausea, vomiting) rates and severities similar to placebo
- Androgenic adverse events (edema, BPH, PSA increase, hypertension†) similar to placebo
  - No concerning cardiovascular signals
  - These safety data align with recent investigations into long-term testosterone therapy in hypogonadal men (i.e. TRAVERSE study)[1]

TEAEs = Treatment Emergent Adverse Events; SAEs = Serious Adverse Events; PSA = Prostate-Specific Antigen; † New or worsening hypertension. Bhasin et al. 2022, American Heart Journal

LPCN 1144: Key Attributes

Positive results support further development

LPCN 1144
• Oral, prodrug of bioidentical hormone • Liver Health: Positive findings for MASH resolution • Liver Health: Positive reductions in liver injury markers • Side effects: Minimal

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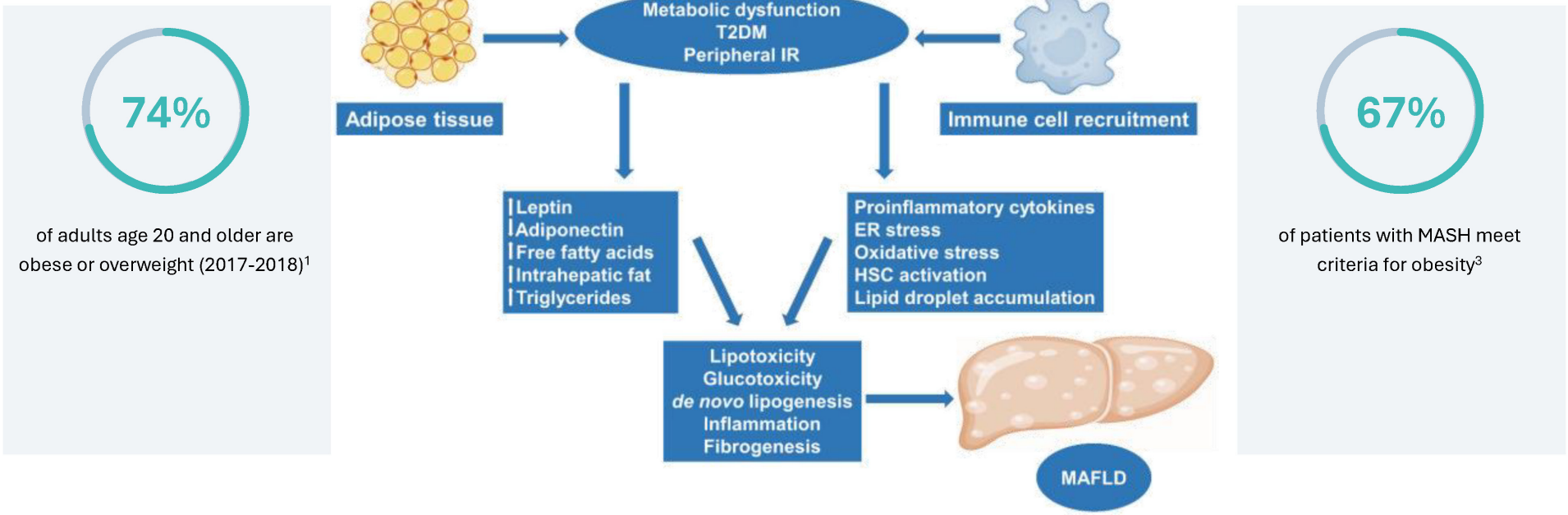
Addressing the role of obesity

Obesity - A Growing Epidemic in US

Obesity is a major risk factor for the development and progression of MASH



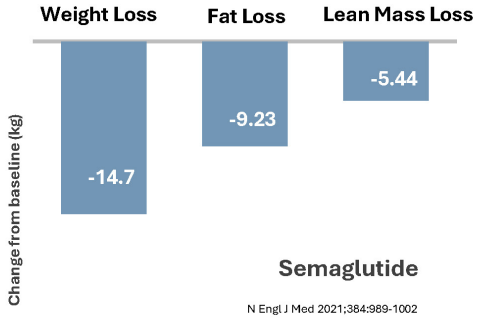
Phase 2 clinical trials with incretin mimetics have demonstrated improvements in MASH outcomes[4,5]

1. https://www.cdc.gov/nchs/fastats/obesity-overweight.htm
2. Figure from Arvanitakis et al. 2023, Int J Mol Sci
3. Tapper et al. 2023, BMC Gastroenterology
4. Newsome et al. 2021, N Engl J Med
5. Loomba et al. 2024, N Engl J Med

Limitations of Incretin Mimetics (GLP-1 Receptor Agonists)

Significant loss of lean mass and fat rebound potential upon cessation

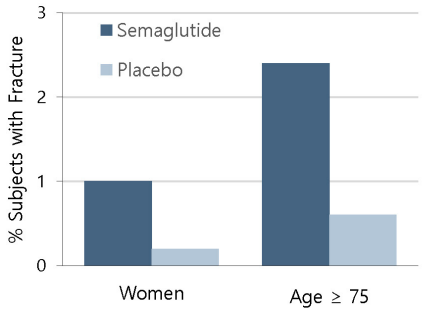
Loss of Lean Mass



GLP-1 agonist treatment led to 15-21% rapid weight loss with unwanted LBM loss of up to 40% of the total weight lost[1]

Lean mass/muscle wasting at an alarming rate and extent

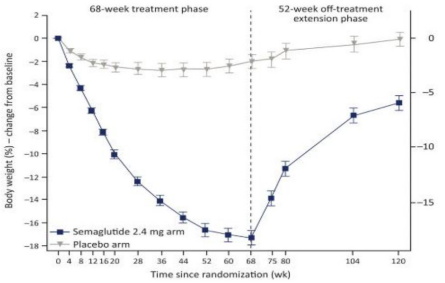
Increased Fracture Risk



Patients on semaglutide had significantly more fractures of the hip and pelvis[2]

Patients who had received semaglutide were 7x more likely to require additional surgery within 1-year post lumbar fusion (TLIF)[5]

Plateauing of Weight Loss/ Rebound Weight Gain



Greatest amount of weight loss is by week 20; weight loss plateaus[1]

68% discontinue within 1 year[7]

Patients who discontinued treatment had significant weight gain[3,6] and HbA1c increase[4]

1. N Engl J Med, 384:989-1002, 2021
2. Wegovy label (Revised 03/2024)
3. JAMA, 325(14):1414-1425, 2021
4. Cureus 15(10): e46490
5. Khalid, S. American Association of Neurological Surgeons 2024 Annual Meeting, May 2024
6. Wilding et al., Diab, Obes, Met, 24:1553-64, 2022
7. https://www.reuters.com/business/healthcare-pharmaceuticals/most-patients-using-weight-loss-drugs-like-wegovy-stop-within-year-data-show-2023-07-11/

LPCN 2401 Novel Oral Treatment for Obesity and Weight Management

Proven potential to improve body composition - quality weight loss with quality fat loss

Product Candidate Attributes

- Proprietary androgen receptor agonist (ARA)
- Proprietary androgen receptor agonist (ARA) with α-tocopherol

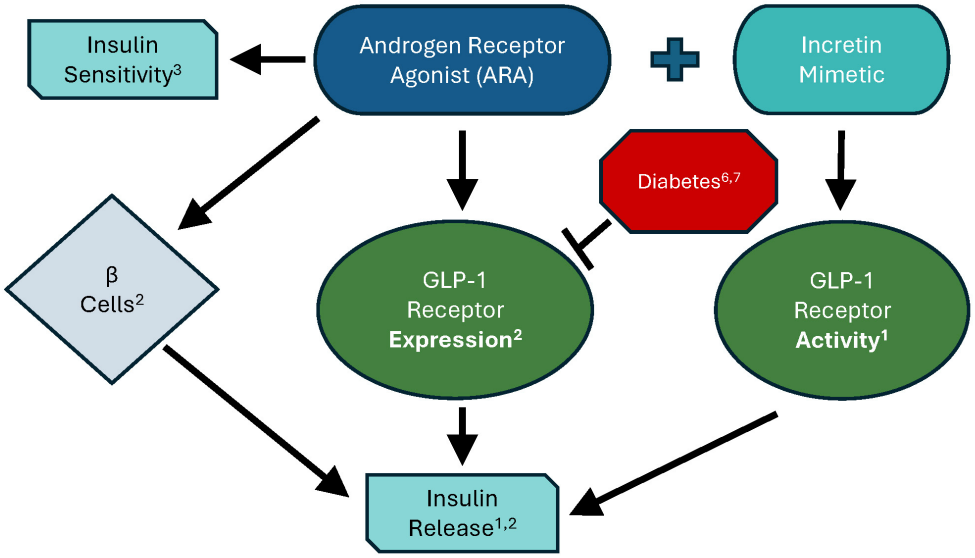
Targeted Mechanism of Actions

	Fat	Muscle	Bone
Androgen Receptor Agonist	• Induces lipolysis[1] • Lowers lipogenesis[1] • Inhibits expression of adipocytokines (e.g., leptin, TNF-α, IL-6, IL-1) [2]	• Stimulates muscle satellite activator, FGF2[3] • Modulates muscle growth suppressors MRF4 and myostatin (GDF8) expression in skeletal muscle[3]	• Acts directly on osteoblasts and consequently promotes bone formation[4] • Increases AR expression level in osteoblasts[4,5]

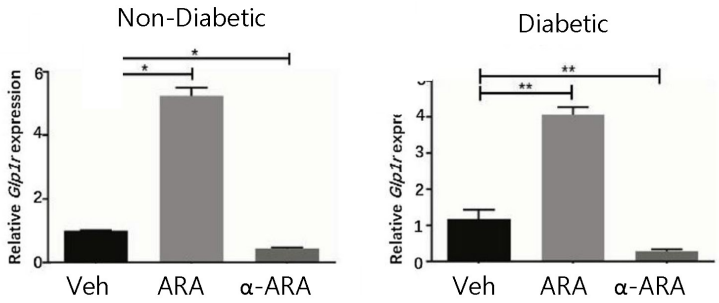
1. Biochimie,87(1):39-43, 2005
2. J Endocr Soc. 2019 Jan 1; 3(1): 91–107
3. J Clin Endocrinol Metab, 104(6): 2094–2102, 2019
4. Clin. Interv. Aging 2016, 11, 1317–1324
5. Horm. Metab. Res. 2004, 36, 674–678

LPCN 2401: Potential to Amplify Effects of Incretin Mimetics

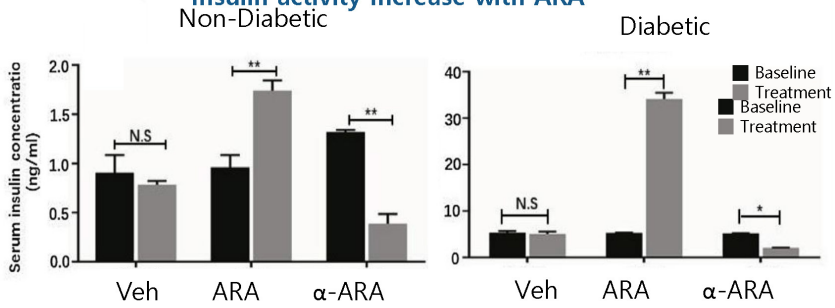
ARA may increase weight loss through increased expression and activity of GLP1R [4,5]



GLP-1 expression increase with ARA[2]



Insulin activity increase with ARA[2]



ARA: Androgen receptor agonist; α-ARA: Androgen receptor antagonist

1) Xu et al., Cell Reports 2023.
2) Zhu et al., Biomed Pharmacoth, 2019 (images modified).
3) Wittert et al., Lancet Diabetes and Endo, 2021 (appendix 2).
4) Xu et al., Diabetes, 2007.
5) Rajan et al., Molecular Metabolism. 2015.
6) Xu et al., Pathophysiology 2007.
7) Shu et al., Hum Mol Genet, 2009.

Phase 2 Study in Patients with Obesity and Overweight

NCT04134091 study design

Three-arm, blinded, placebo-controlled trial in male subjects with MASH (n=56)

- High prevalence of obesity and weight related comorbid conditions such as dyslipidemia, T2DM, and hypertension
- 1:1:1 randomization across three oral treatment arms; Treatment duration of 36 weeks
  - TU mono - Oral TU monotherapy
  - TU combo - Oral TU + d-alpha tocopherol
  - Matching placebo
- Dual Energy X-Ray Absorptiometry (DEXA, n=40) at baseline, 20 weeks, and 36 weeks
  - Prespecified endpoints: change in lean mass and fat mass
- Low testosterone was not a requirement for study eligibility
  - Testosterone levels inversely correlate with BMI[1]
  - > 70% of severely obese men have T < 300 ng/dL [2]

1. Dhindsa et al., Diabetes Care, 2010.
2. Saad et al., Int J Obes, 2016.

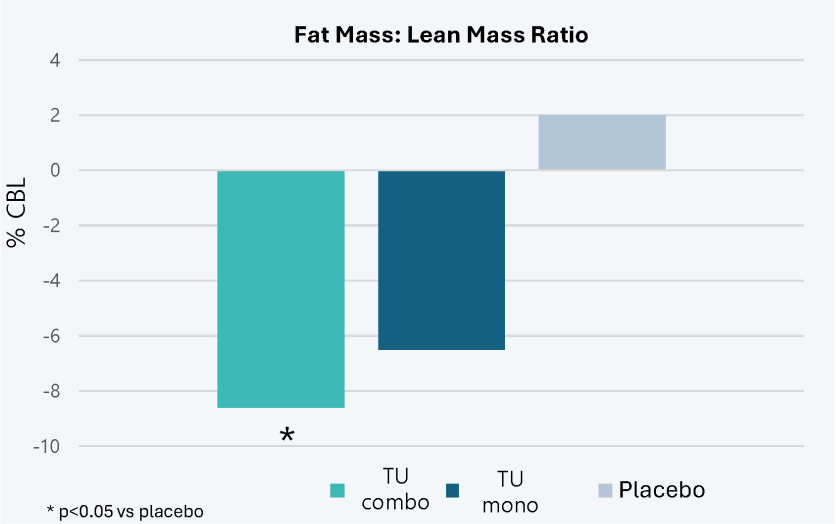
LPCN 2401: Significant Improvement in Participants' Body Composition

Prespecified endpoints met – increased lean mass and decreased fat mass

Body Composition Analysis Set[1]

Parameter at Baseline	TU combo (N=13)	TU mono (N=13)	Placebo (N=14)
Mean Age (years)	53.8	53.2	51.1
Mean Weight (kg)	107.8	111.3	118.6
Mean BMI (kg/m^2)	34.7	35.9	37.2
Fat Mass (DXA) % of total mass	37.2	39.5	39.3
Lean Mass (DXA) % of total mass	62.8	60.5	60.7
Fat Mass:Lean Mass Ratio	0.60	0.67	0.66
Android Fat Mass (DXA) % of FM	11.9	11.5	11.2
BMC (DXA), kg	3.1	3.1	3.0

Body Composition Results



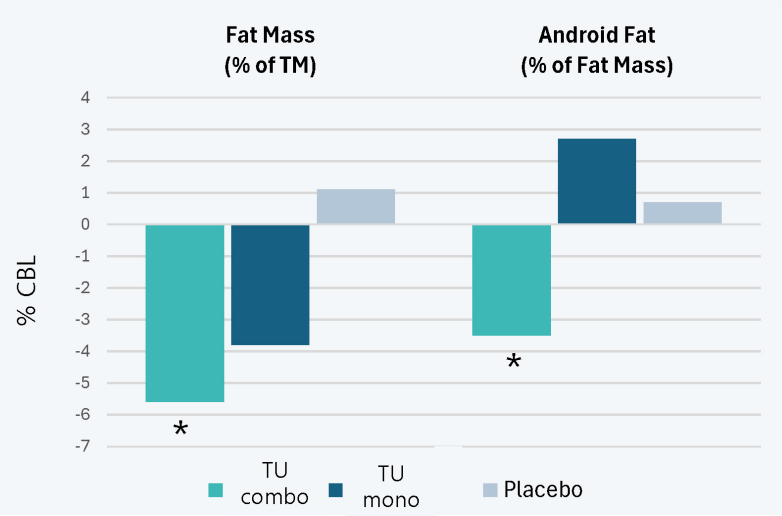
- **Significant improvement in fat to lean ratio**

1. Patient who completed baseline and at least one post-baseline DEXA. *p<0.05 vs placebo. Body composition analysis set; N=40.
2. Note: Population was consistent with FDA's guidance on developing products for weight management. All Participants were male and had either BMI ≥ 30 (n=36) or BMI ≥ 27 with at least one weight-related comorbid condition (n=4).

LPCN 2401 - Significant Improvement in Participants' Body Composition

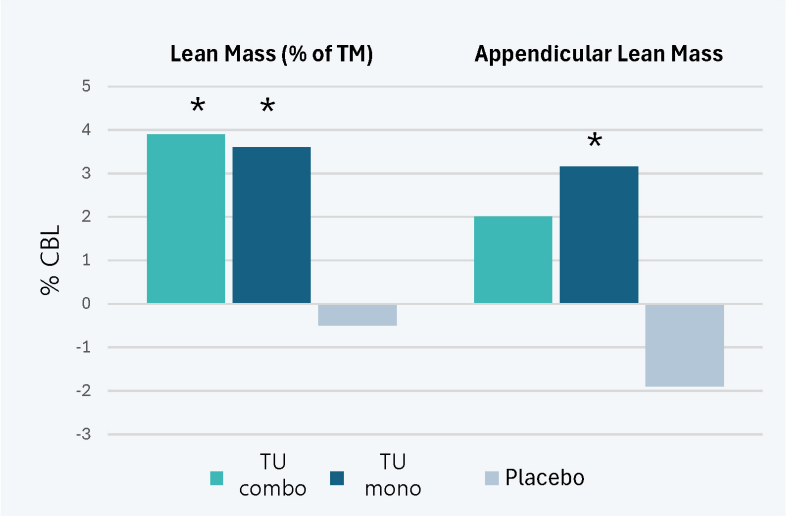
Prespecified endpoints met – increased lean mass and decreased fat mass

Fat Mass



Significant reductions in fat mass

Lean Mass

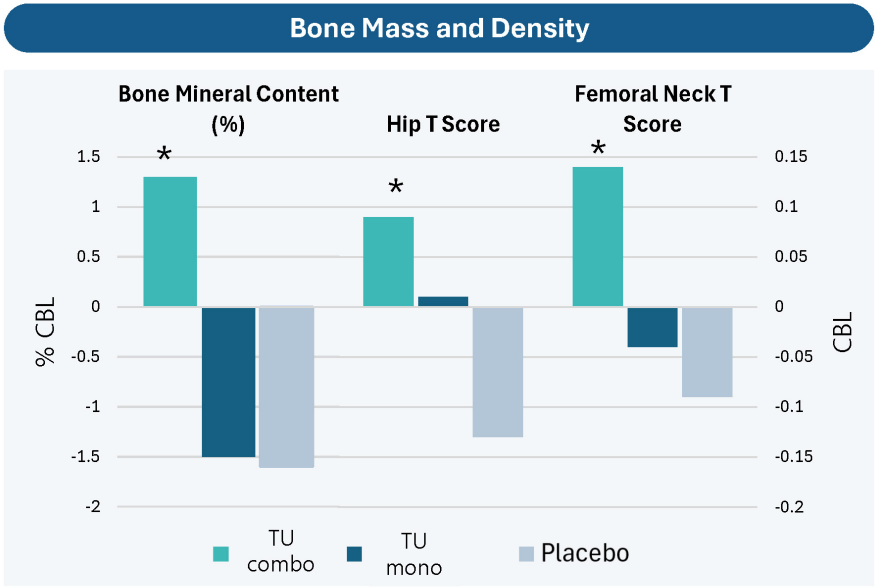


Significant increases in lean mass

- ~1.8 kg increase in whole body lean mass
- ~1.2kg increase in appendicular lean mass

LPCN 2401 - Significant Improvement in Bone Health

Significant increase in bone mass and density



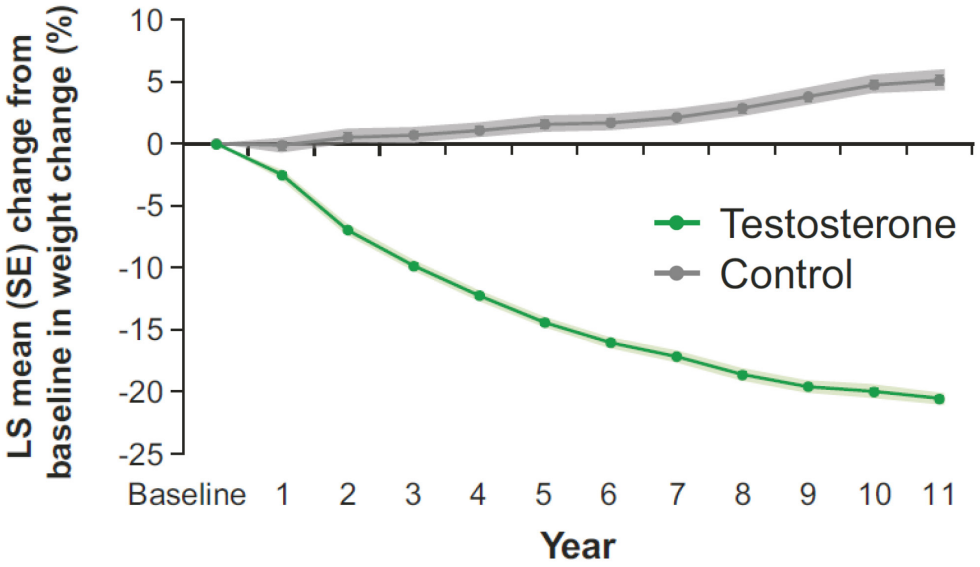
Increase in bone mineral content

- Significant increase in hip and femur T scores

p<0.05 vs placebo
T scores n=16/17, 16, 18 for TU combo, TU mono, and placebo

Testosterone Therapy Reduces Weight

Continued weight loss after initial slow period



T therapy led to continued weight loss over 11-years in obese men with lower T (N=474)[1]

- Weight loss did not plateau, even after 11 years
- Included men with low-normal testosterone (<350 ng/dL)
  - ~50% were diabetic
- Improvement in other cardiometabolic markers including HbA1c, blood pressure, cholesterol
- Significantly fewer deaths and MACE events with T therapy

1. Saad et al., 2020, Int J Obes.

LPCN 2401 - Potential for Differentiated Benefit to Risk Profile

Key takeaways

LPCN 2401

- Oral, QD, prodrug of bioidentical hormone
- Fat loss amplification
  - Lower fat mass (preferably VAT and android fat)
- Improve/preserve lean mass
  - Muscle mass, quality, and functionality
  - Bone health
- GLP amplification: genomic and non genomic
- GI side effects: minimal
- Muscle spasm AE: None observed
- Liver Health: Beneficial effects (MASH resolution, injury markers)
- Serum Alkaline phosphatase: lowers (no increase)
- Impact on sex hormone (FSH, LH, and Estradiol) : minimal

Competitive landscape*

- **Myostatin /activin receptor modulators (e.g. bimagrumab, apitegromab, taldefgrobep, KER-065, and trevogrumab)[1,2]**
  - Invasive - IV/SC
  - Moderate to high GI side effects[2,3]
  - Reports of muscle spasms[2,3]
  - Increased serum Alkaline Phosphatase[3]
  - Sex hormone changes (FSH/LH)[4]
  - Unclear muscle functionality Improvement
  - Long term exposure risks unknown
- **SARM (e.g. Enobosarm)[5]**
  - Oral
  - Bone health concerns (estradiol suppression?)
  - Liver toxicity concerns

*select list with reported body composition improvement P2 results

1. J Bone Metab. 2020 Aug; 27(3): 151–165
2. J Cachexia Sarcopenia Muscle. 2020 Dec; 11(6): 1525–1534
3. JAMA Netw Open. 2021;4(1):e2033457.
4. Clin Endocrinol (Oxf) 2018 Jun;88(6):908-919
5. Sex Med Rev. 2019 Jan;7(1):84-94

LPCN 2401 - A New Paradigm in Oral Treatment for Obesity and Weight Management

Target benefits to improve body composition

Adjunct to GLP-1 agonist treatment

Quality fat loss

Quality weight loss

Weight loss

Amplify fat loss

High android/visceral fat loss

Improve bone health

Attenuate muscle loss

Post cessation of GLP-1 agonist treatment

Minimize fat regain

Increase lean mass

Minimize weight rebound

Sustain HbA1c improvement

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