

# Circulating miRNA as Biomarkers of Obesity

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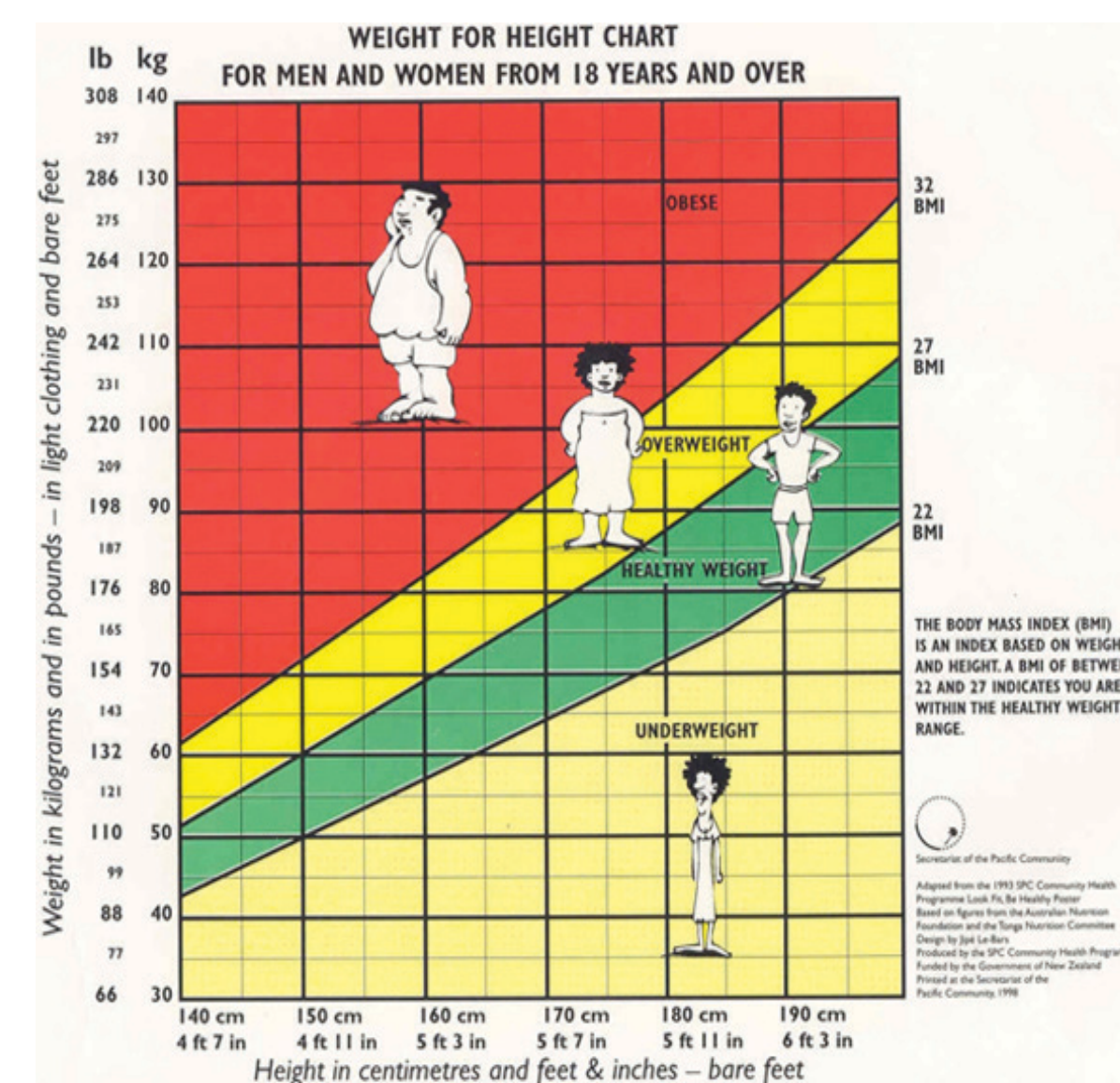
## Background

Obesity is a major problem for girls in the U.S.A.

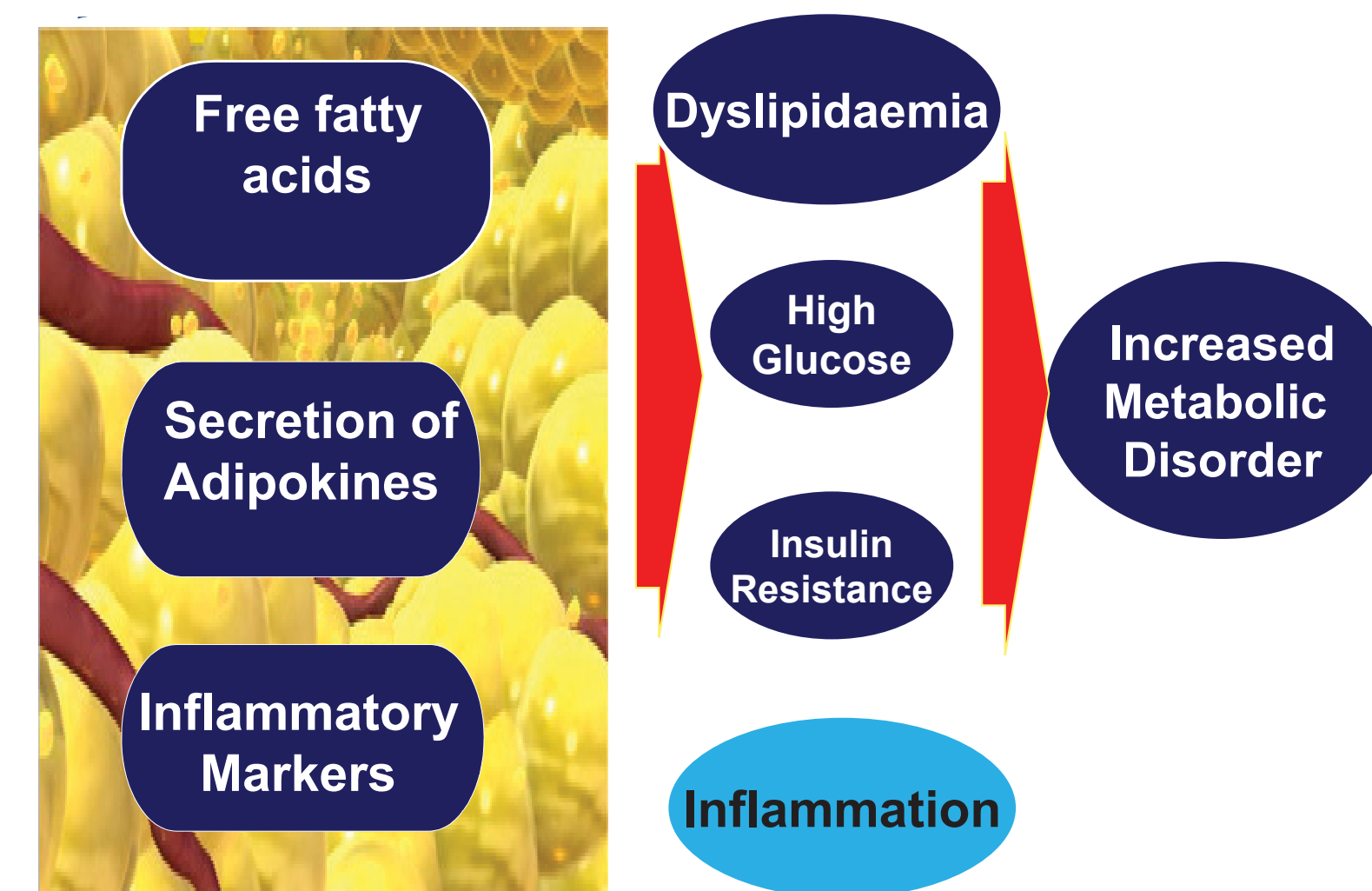
Obesity among girls aged 2-19 years, by selected characteristics: United States, selected years 1983-1986 through 2007-2010									
Age, sex, race and Hispanic origin	1983-1986	1971-1974	1976-1980	1988-1994	1999-2002	2001-2004	2003-2006	2005-2008	2007-2010
Percent of population									
2-5 years									
Not Hispanic or Latina:									
White only.....	---	---	---	5.9	*9.0	*9.1	10.4	11.3	*9.2
Black or African American only.....	---	---	---	7.6	9.6	12.2	16.6	14.3	*14.2
Mexican.....	---	---	---	12.3	*12.2	*15.7	14.5	10.8	*9.9
6-11 years									
Not Hispanic or Latina:									
White only.....	---	---	---	5.2	*9.8	13.1	15.6	14.4	14
Black or African American only.....	---	---	---	11.2	17	22.8	24.8	24	24.5
Mexican.....	---	---	---	9.8	15.3	17.1	16.6	19.7	21.2
12-19 years									
Not Hispanic or Latina:									
White only.....	---	---	---	4.6	8.9	12.6	14.6	14.5	14
Black or African American only.....	---	---	---	10.7	16.3	23.5	23.8	27.7	27.1
Mexican.....	---	---	---	8.8	*13.4	19.6	17.1	19.9	21.3

Source: CDC/NCHS. Available from <http://www.cdc.gov/nchs/data/nhsr/nhsr025.pdf>

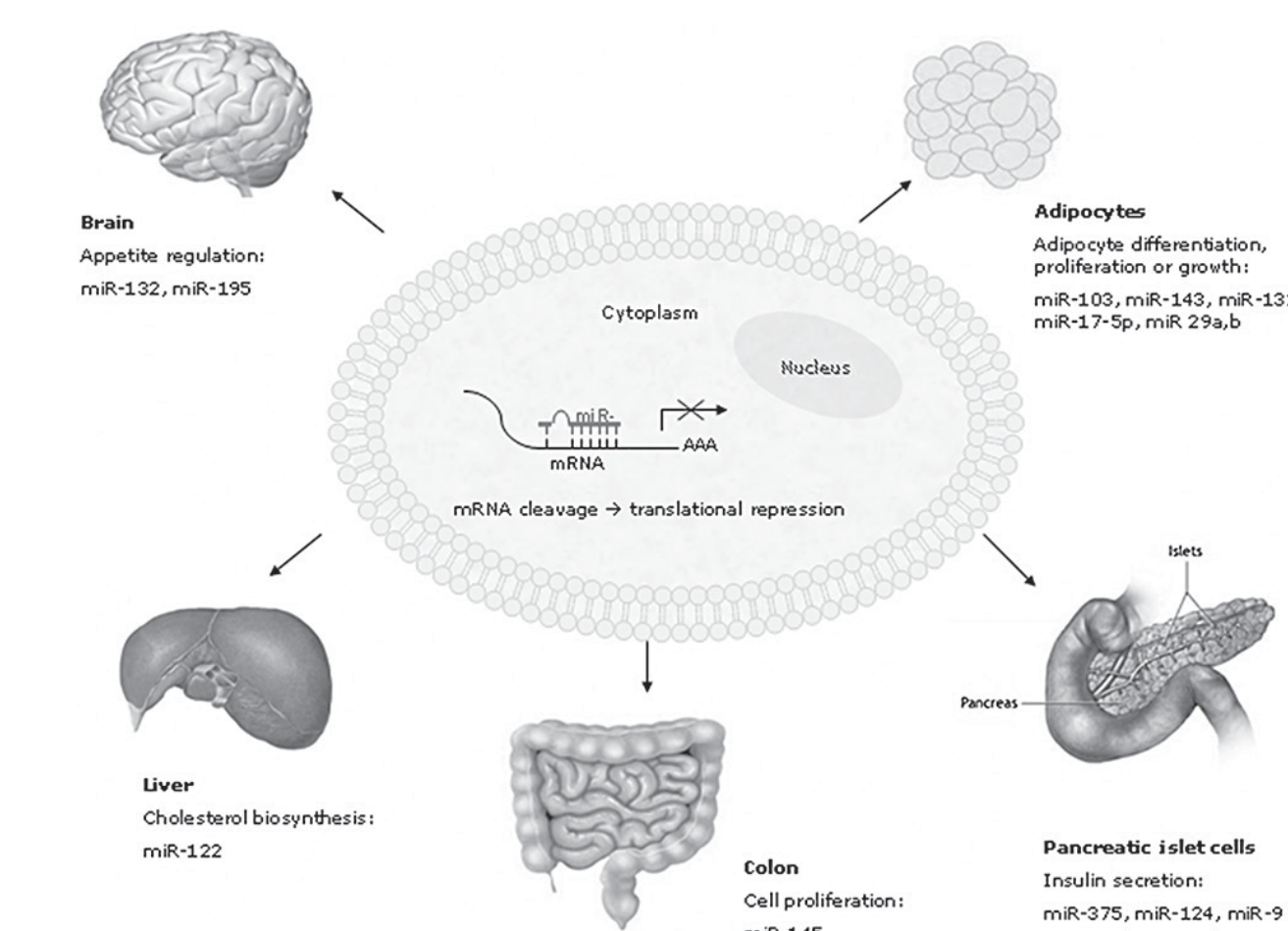
Obesity is, in general, defined by the BMI



Intra abdominal fat contributes to metabolic disorders



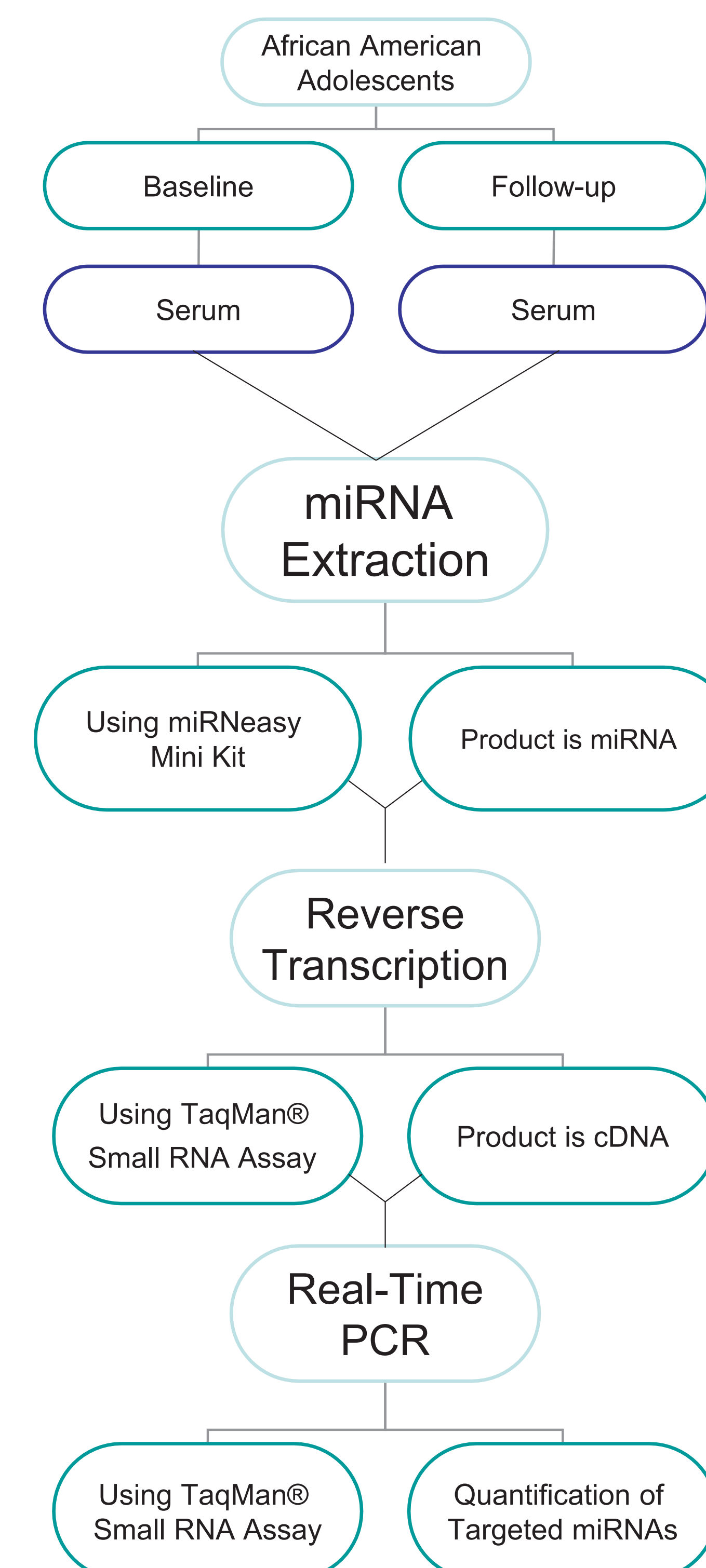
microRNA are involved in several processes associated with obesity



**Aim:**

- Standardize the technique for the extraction of miRNA from serum
- Do a pilot analysis to compare the levels of miRNA in obese AA adolescents before and after diet intervention

## Methodology



**miR-143:** The first microRNA found to be associated with obesity. *Guo Y. (2012) MicroRNAome Comparison between Intramuscular and Subcutaneous Vascular Stem Cell Adipogenesis. Page 1.* Increased miR-143 expression is associated with an elevated body weight—impairs glucose metabolism. It is a potential target for the treatment of obesity-associated diabetes. *Jordan SD (2010) Obesity-induced overexpression of miRNA-143 inhibits insulin-stimulated AKT activation and impairs glucose metabolism. Page 434*

**miR-223:** Has been found to be down regulated after weight loss. *Miliagro FI (2013) High-Throughput Sequencing of microRNAs in Peripheral Blood Mononuclear Cells: Identification of Potential Weight Loss Biomarkers. Page 5*

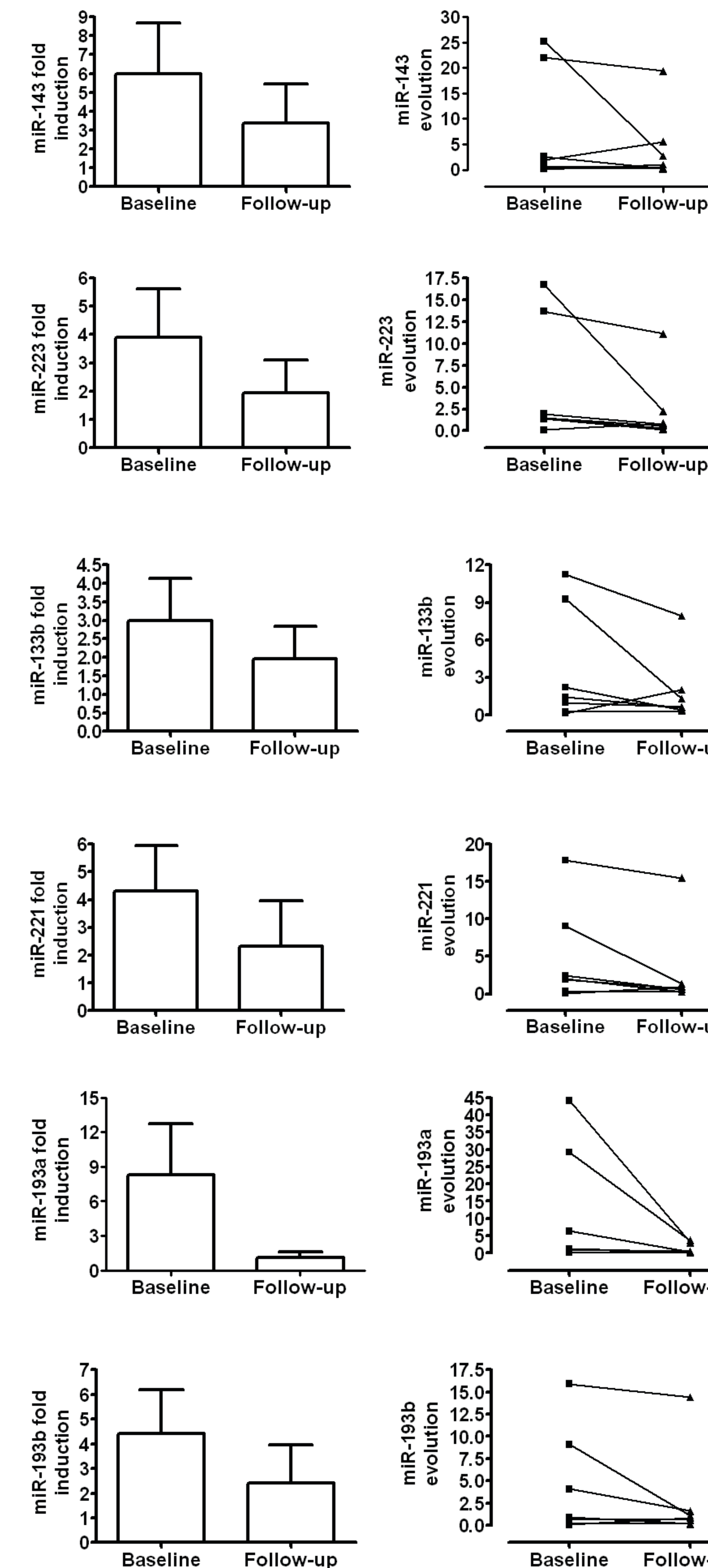
**miR-221:** Expression levels of miR-221 were positively correlated with BMI (particularly in women) and fasting insulin concentrations. *Meerson A (2013) Human adipose microRNA-221 is upregulated in obesity and affects fat metabolism downstream of leptin and TNF-α.*

**miR-193a/b:** miR-193a-3p and miR-193b-5p were negatively correlated with BMI. *Meerson A (2013) Human adipose microRNA-221 is upregulated in obesity and affects fat metabolism downstream of leptin and TNF-α.*

**miR-133b:** Has been associated with inflammation. Shows a down regulation after exercise. *Nielsen S (2010) Muscle specific microRNAs are regulated by endurance exercise in human skeletal muscle.*

## Results

We observed a trend towards reduction in the levels of miRNA in the follow up samples.



## Conclusions

Serum is a good source of miRNA for global association studies.

Diet intervention has an effect on the levels of the targeted miRNAs.

There was a general trend toward reduction in the levels all miRNA.

miR-193a showed the biggest decrease post intervention (p=0.04).

We may be able to reach more significance if we increase the number of samples analyzed.

## Future Directions

Increase sample size.

Show a relationship with weight loss and targeted miRNAs.

Expand research with exercise intervention.

Deep sequencing to broaden the amount of targeted miRNAs.

## Acknowledgements

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