

# The Role of Ultrasound in the Management of Inguinal Hernias

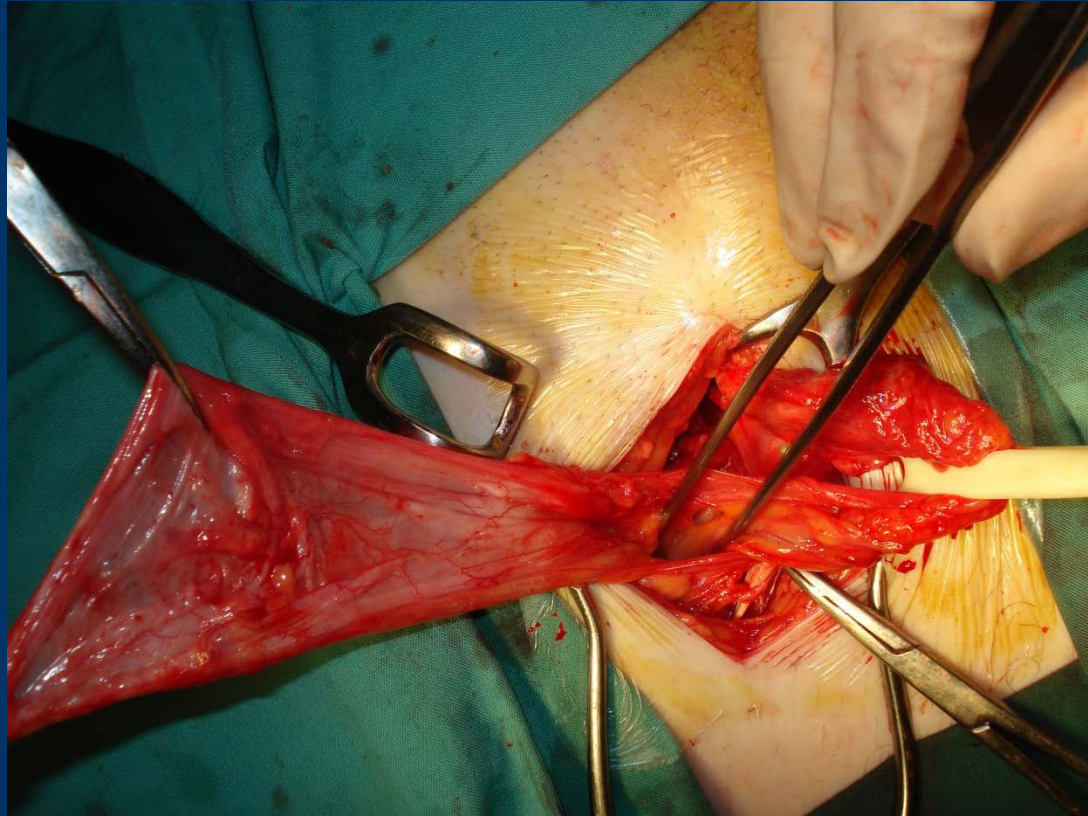
Gwendolen W.C. Cheung,

*Dept. of Medical Imaging & Radiation Sciences, Monash University*

*A/Prof Maurice Brygel, Melbourne Hernia Clinic. Masada Private Hospital, St. Kilda East.*

*A/Prof Michal E. Schneider, Dept. of Medical Imaging & Radiation Sciences, Monash University*

# What is an inguinal hernia?



- 80% of abdominal hernias
- More common in males
- Indirect and direct types

FIG 1: Image of an indirect inguinal hernia operation demonstrating the spermatic cord and hernia sac. (Source: M.Brygel)

# Classification of inguinal hernias

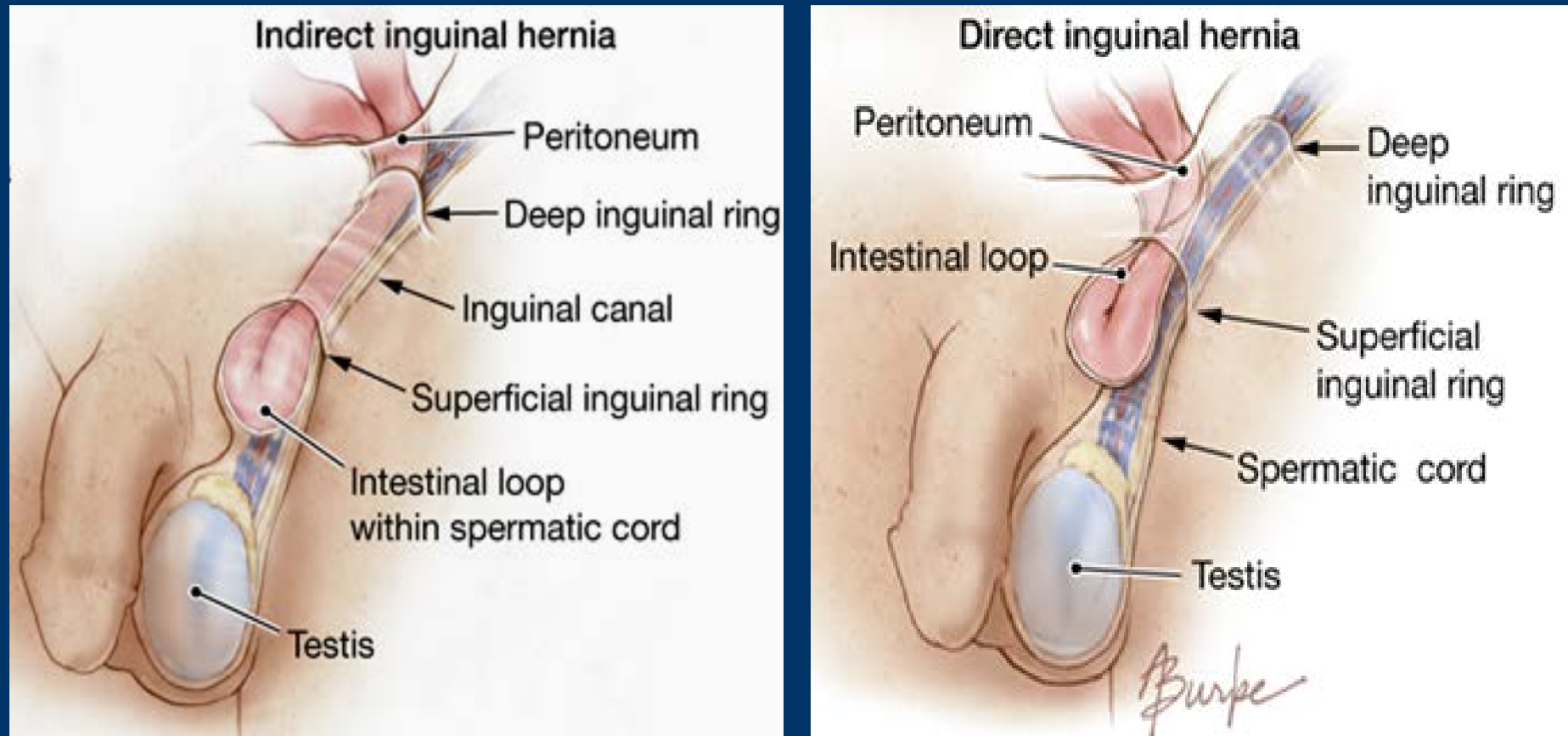


FIG 2: Illustration demonstrating indirect and direct inguinal hernias (Source: Pluta R.M., 2011)



# Ultrasound

- Cost effective
- Readily available
- No ionising radiation
- Differential diagnosis of other groin pathologies



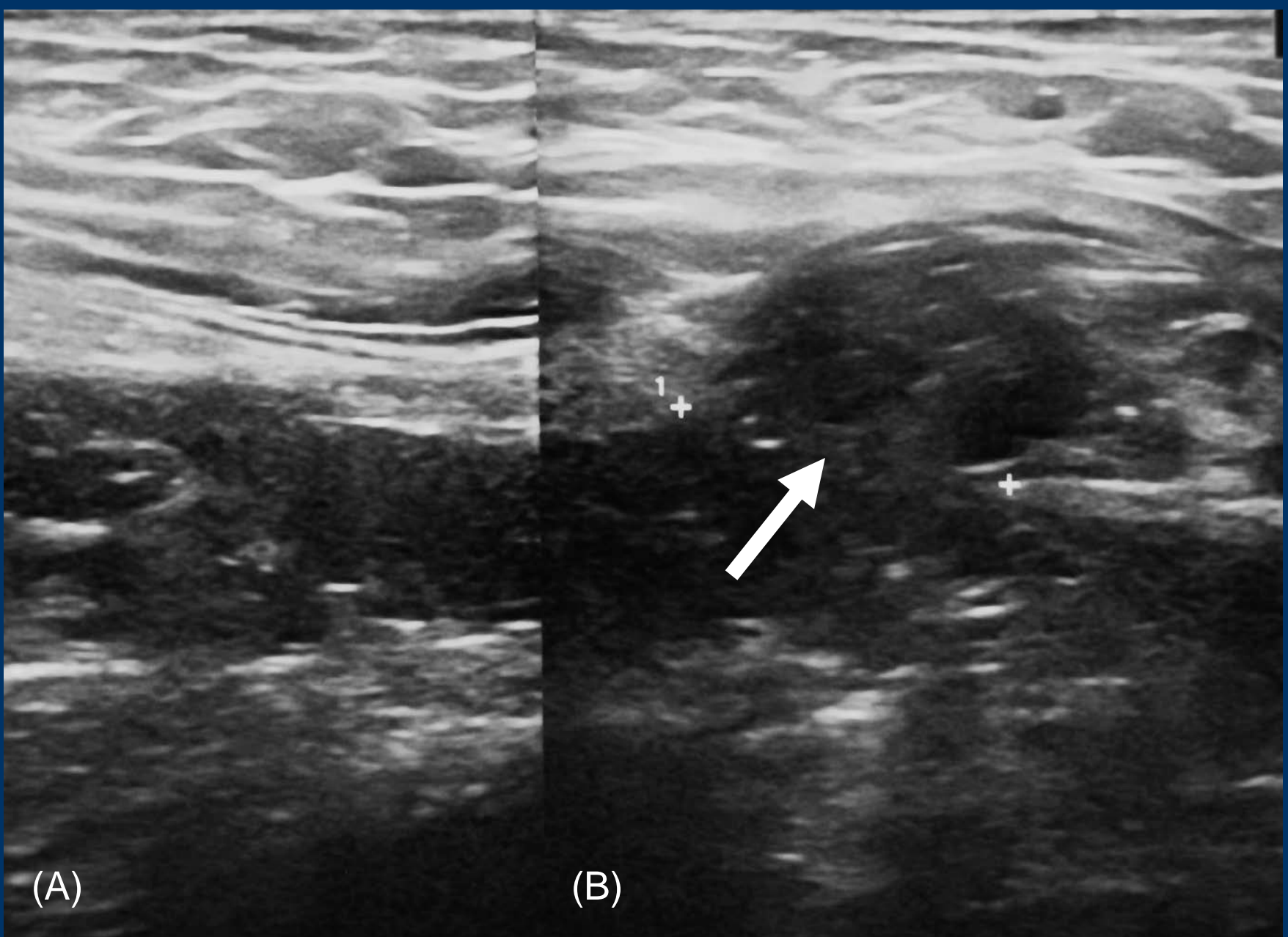


FIG 3: Ultrasound of a right direct inguinal hernia with the patient relaxed (A) and straining (B). (Source: M.Brygel)



# Background

## Opinion from surgeons' perspective

- Discrepancies between ultrasound and surgical findings
- Overuse of ultrasound
- Variable performance of ultrasound
  - Sensitivity of 33-95% (Alam et al, *Eur Radiol* 2005; 15:2457–61, Robinson et al, *Am J Roentgenol* 2006; 187:1168–1178)

# Aims

1. To investigate the role of ultrasound in the management of inguinal hernias.
2. To determine the accuracy of ultrasound in the diagnosis of inguinal hernias.
3. To determine the accuracy of ultrasound in the classification of direct and indirect inguinal hernias.

# Methods

- Retrospective study approved by MUHREC

## Inclusion criteria

- January 2011 to September 2013
- > 21 years of age
- Inguinal hernias with ultrasound prior to referral to with a specialist surgeon

## Exclusion criteria

- Patients without surgery



# Methods

## Data collection

- Ultrasound reports
- Clinical reports
- Surgical and audit reports

## Statistical analysis

- Surgical findings = Gold Standard
- Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy

# Results

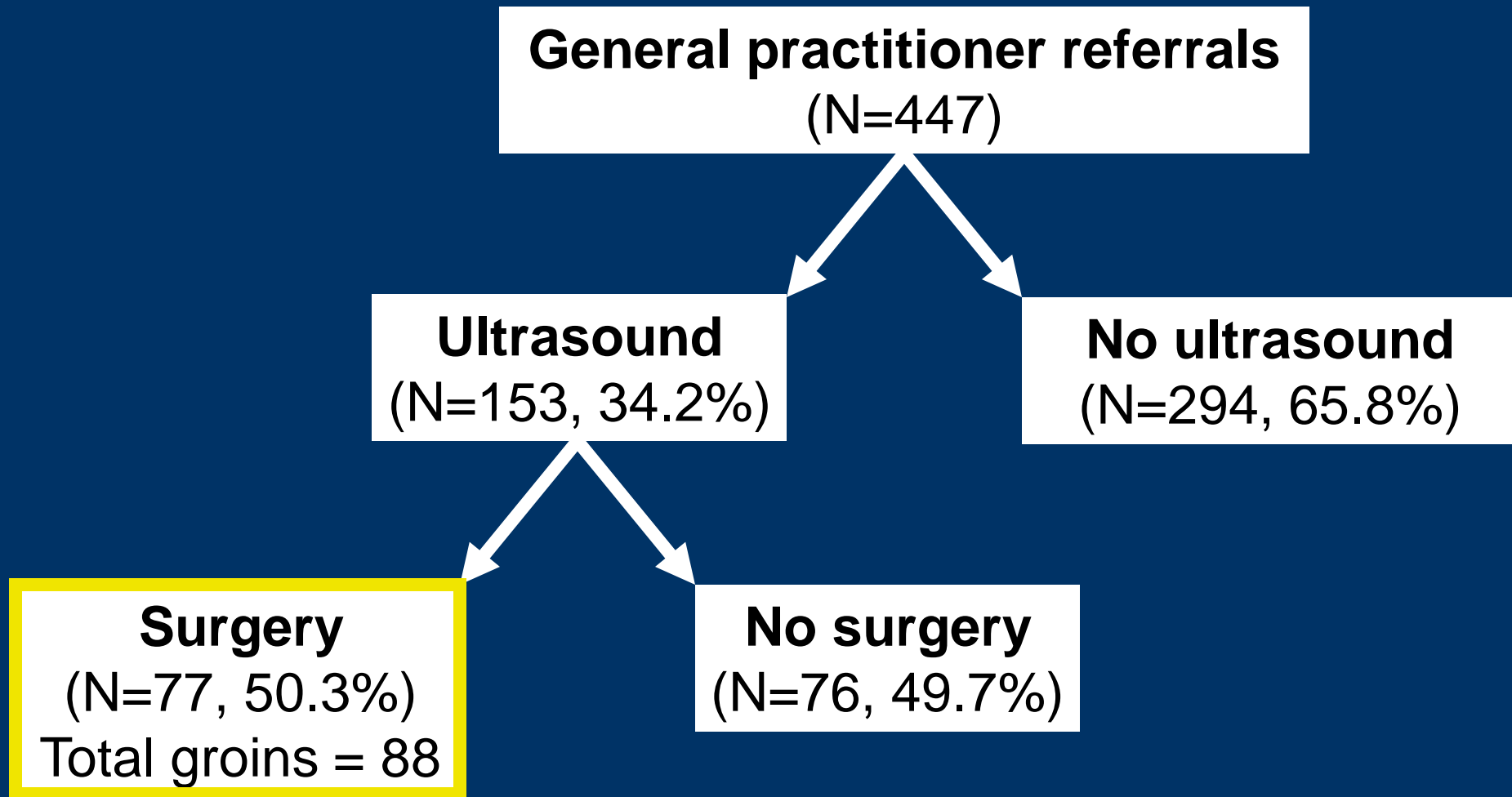


FIG 4: Flow chart of patients with inguinal hernias referred to Masada Private Hospital from January 2011 to September 2013 .

# Results

**TABLE 1:** Surgical findings

<b>Surgical diagnosis</b>		
Inguinal hernia	70/88	(79.5%)
Lipoma	13/88	(14.8%)
Wall weakness	3/88	(3.4%)
Femoral hernia	1/88	(1.1%)
Meshoma	1/88	(1.1%)
<b>Inguinal hernia classifications</b>		
Direct	22/88	(25%)
Indirect	43/88	(48.9%)
Not specified	5/88	(5.7%)
No hernia	18/88	(20.5%)

# Results

**TABLE 2:** Ultrasound and clinical examinations vs surgical findings in the diagnosis of inguinal hernias (N=88)

	Ultrasound	Clinical examination
<b>Sensitivity</b>	98.6%	98.6%
<b>Specificity</b>	11.1%	22.2%
<b>PPV*</b>	81.2%	83%
<b>NPV*</b>	66.7%	80%
<b>Accuracy</b>	80.7%	83%

PPV\* = Positive predictive value, NPV\* = Negative predicative value

# Results

## Classification of inguinal hernias

### Surgical findings

- 43 indirect inguinal hernias
- 22 direct inguinal hernias

### Ultrasound vs surgery

- 31/43 (72.1%) indirect inguinal hernias
- 13/22 (59.1%) direct inguinal hernias
- Overall accuracy = 67.7%

# Discussion

- Ultrasound has high sensitivity but low specificity
- Ultrasound is less accurate than clinical examination (80.6% vs 83%)



# Discussion

- Lipoma of the spermatic cord or round ligament
  - largest cause of negative findings
  - often misdiagnosed
  - contributes to low specificity of both ultrasound and clinical examination

# Discussion

## Study limits

- Limited cohort
- Interobserver variability with ultrasound
- Interpretation bias with clinical examinations

# Conclusion

- Necessity of ultrasound is questionable
- Can be used to aid GPs in diagnosis
- Limited diagnostic value for specialist surgeons
  - Clinical examination is sufficient
  - Operative decision depends on hernia size and reducibility, patient health and operation risks

# Acknowledgements

A/Prof Maurice Brygel

A/Prof Michal Schneider

Dr. Luke Bonato

**Questions?**