

# COVID-19

## Sex Hormones and Disease Severity

**?** Are levels of circulating sex hormones related to COVID-19 severity?

### **Background**

Men are more likely than women to develop severe COVID-19. Whether this sex-specific risk is related to sex hormones (eg, testosterone and estradiol) and inflammation is not fully understood.

### **Methods and Results**

Prospective study of 152 patients in a Missouri hospital with SARS-CoV-2 infection confirmed by PCR from March to May 2020

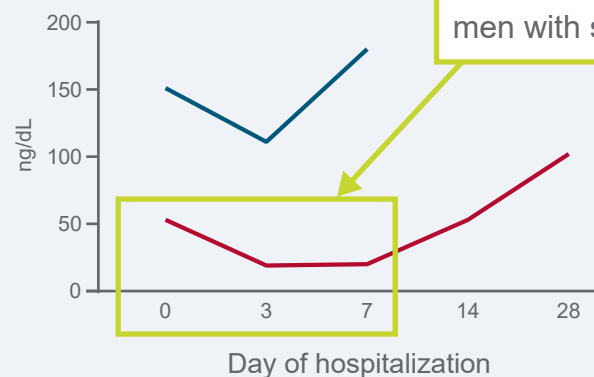
### Sex Hormones Levels and COVID-19 Severity

#### Men (n=90)



- Mild COVID-19 (n=24)
- Severe COVID-19 (n=66)

#### Testosterone



Testosterone levels were lower in men with severe COVID-19

Estradiol and IGF-1 levels were not associated with COVID-19 severity.

#### Women (n=62)



Testosterone, estradiol, and IGF-1 levels were not associated with COVID-19 severity in women.

**→** Low levels of circulating testosterone were associated with severe COVID-19 in men but not in women.

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## Sex Hormones and Disease Severity

### Article Title: Association of Circulating Sex Hormones with Inflammation and Disease Severity in Patients with COVID-19

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### Background

- Men are more likely than women to develop severe COVID-19.<sup>1</sup>
- Whether sex hormones contribute to COVID-19 severity is unknown, although some studies have shown that men with low testosterone have chronically elevated levels of inflammatory mediators.<sup>2,3</sup>
- **Objective:** In this study, investigators examined the association of serum testosterone, estradiol, and insulin-like growth factor 1 (IGF-1) with COVID-19 severity.

### Methods

- A prospective cohort study was conducted using serum samples from consecutive patients presenting with COVID-19 symptoms between March and May 2020 at the Barnes Jewish Hospital, St. Louis, MO; infection was confirmed by molecular testing.
- For comparison between patients with severe and mild COVID-19, levels of circulating sex hormones (ie, testosterone, estradiol, IGF-1) were measured on Day 0 (at presentation) and Day 3 of hospitalization.
  - Severe COVID-19 was defined by death due to COVID-19 or patients requiring ICU care, supplemental oxygen due to hypoxia, or mechanical ventilation.
  - Levels of inflammatory markers were also measured in a subset of patients on Day 0.

### Results

- Among the 152 consecutive patients (90 men, 62 women) who presented with COVID-19, 73% (66/90) of men and 60% (37/62) of women had severe disease.
- Among men, median (interquartile range) testosterone levels were significantly lower in those with severe COVID-19 than in those with mild disease (all comparisons  $P < 0.05$ ):
  - Hospital Day 0: 53 (8-114) ng/dL vs 151 (95-217) ng/dL
  - Hospital Day 3: 19 (6-68) ng/dL vs 111 (49-274) ng/dL
- Testosterone concentrations were also inversely associated with inflammatory markers ( $P < 0.05$ ) in men.
- Estradiol and IGF-1 concentrations were not associated with severe COVID-19 in men.
- Among women, sex hormone concentrations were similar in those with severe and mild COVID-19.

### Conclusions

- These findings indicate that lower circulating testosterone levels are associated with severe COVID-19 and inflammation in men but not in women.
- Further studies will be needed to determine whether testosterone is a marker or cause of COVID-19 severity.

### References

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