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## Background and objectives

- Microvascular abnormalities (including enlarged vessels and reduced capillary density) are a hallmark of SSc.
- Computerised nailfold videocapillaroscopy (NVC) is a high-magnification tool (300x) able to image such changes.
- However, in patients with SSc, nailfolds can display a mixture of normal/abnormal vessels and conversely, healthy individuals (healthy controls, HC) may sometimes display isolated abnormalities (potentially leading to misdiagnosis).

## Study design and methods

- At a single centre, patients with SSc and HC were imaged with NVC (panoramic mosaic of the whole nailfold).
- For each image, the number of distal vessels was counted and the width at each apex measured. The density of vessels/mm in each nailfold was calculated.
- The distribution of vessel width and density was described in healthy subjects to ascertain the range of normality at the relevant vessel, nailfold and patient levels.

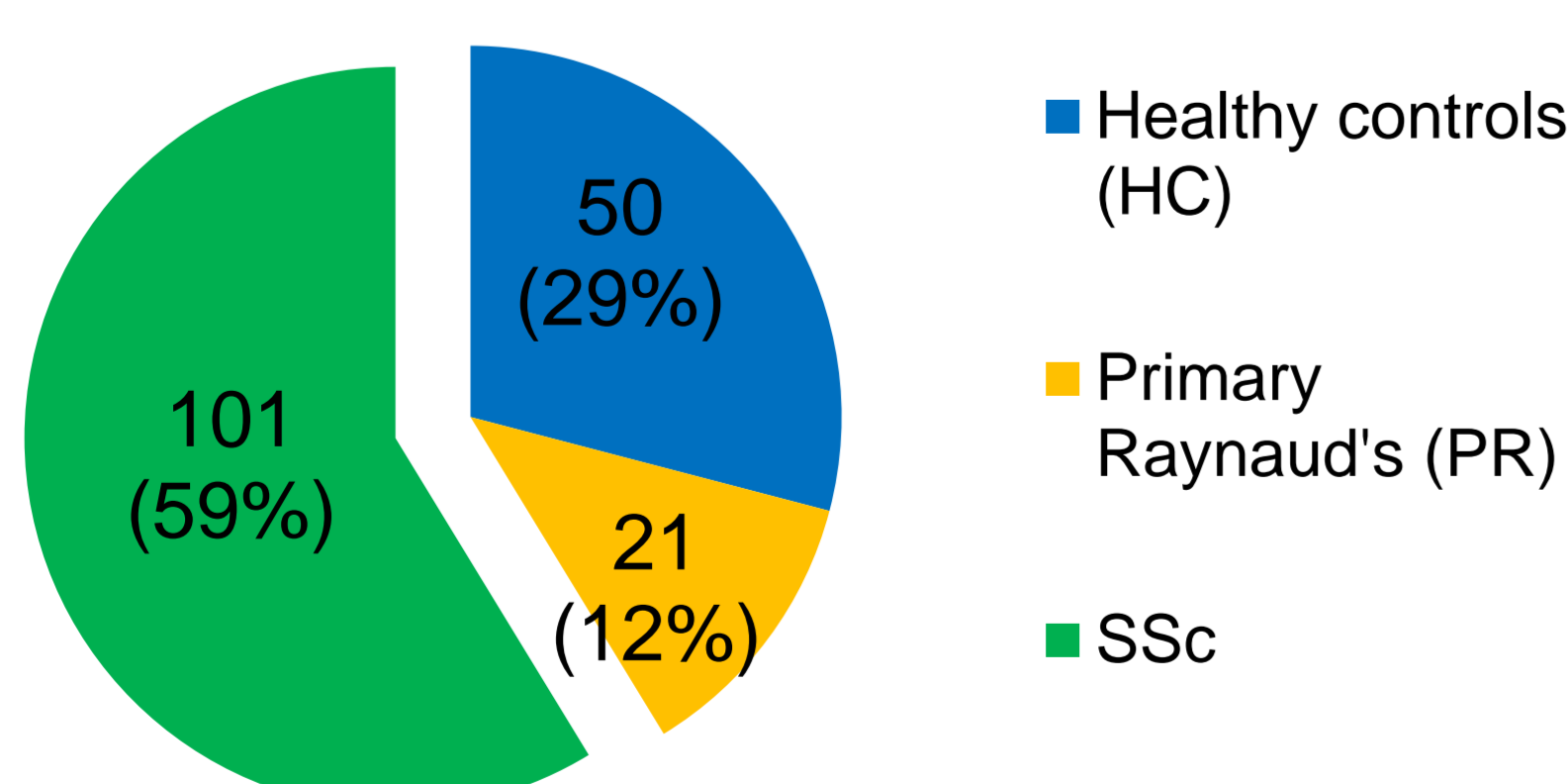


Figure 1. Composition of study cohort

- 50 HCs, 21 PR and 101 SSc patients were recruited (Figure 1). 1326 nailfolds were imaged in total and the median number of fingers assessed was 9.

## Results

Level/Characteristic		Healthy controls (HC)	Primary Raynaud's (PR)	SSc	p*
		mean (SD)	mean (SD)	mean (SD)	
Vessel	Width (µm)	12.9 (4.1)	13.6 (4.8)	20.2 (16.2)	<0.0001
Nailfold	Mean vessel width (µm)	12.7 (2.8)	13.9 (4)	21.4 (13.1)	<0.0001
	Max. vessel width (µm)	18.6 (6.2)	21.4 (7.7)	37 (33.2)	<0.0001
	Density (vessels/mm)	11.2 (2.8)	9.4 (2.3)	8.1 (3.2)	<0.0001
Patient	Mean vessel width (µm)	12.7 (2.1)	13.6 (2.5)	20.7 (8.4)	<0.0001
	Max. vessel width (µm)	25.1 (8.8)	29.6 (12.5)	66.9 (60.5)	<0.0001
	Mean density (vessels/mm)	11.4 (2)	9.5 (1.3)	8.2 (2.3)	<0.0001
	Min. density (vessels/mm)	8.5 (1.9)	7.1 (1.4)	5.5 (2.3)	<0.0001

p\*: Comparison of characteristics between groups using the Kruskal-Wallis test

Table 1. Comparison of vessel width and vessel density between groups

### Key findings: Vessel width

- Vessels belonging to HCs, PR and SSc patients varied in terms of width ( $p < 0.0001$ ) (Table 1).
- In HCs, the widest 1% of vessels measured  $26\mu\text{m}$  or more (Figure 2). We can define this as an arbitrary threshold for 'wide vessels' in HCs.
- Despite being rare in HCs overall, these 'wide' vessels were not isolated among a small number of fingers or patients: in HCs, 11.0% of nailfolds and 38% of individuals had at least one (Figure 4)
- In those individuals, this occurred three or fewer times across nailfolds in most cases (73.7%)

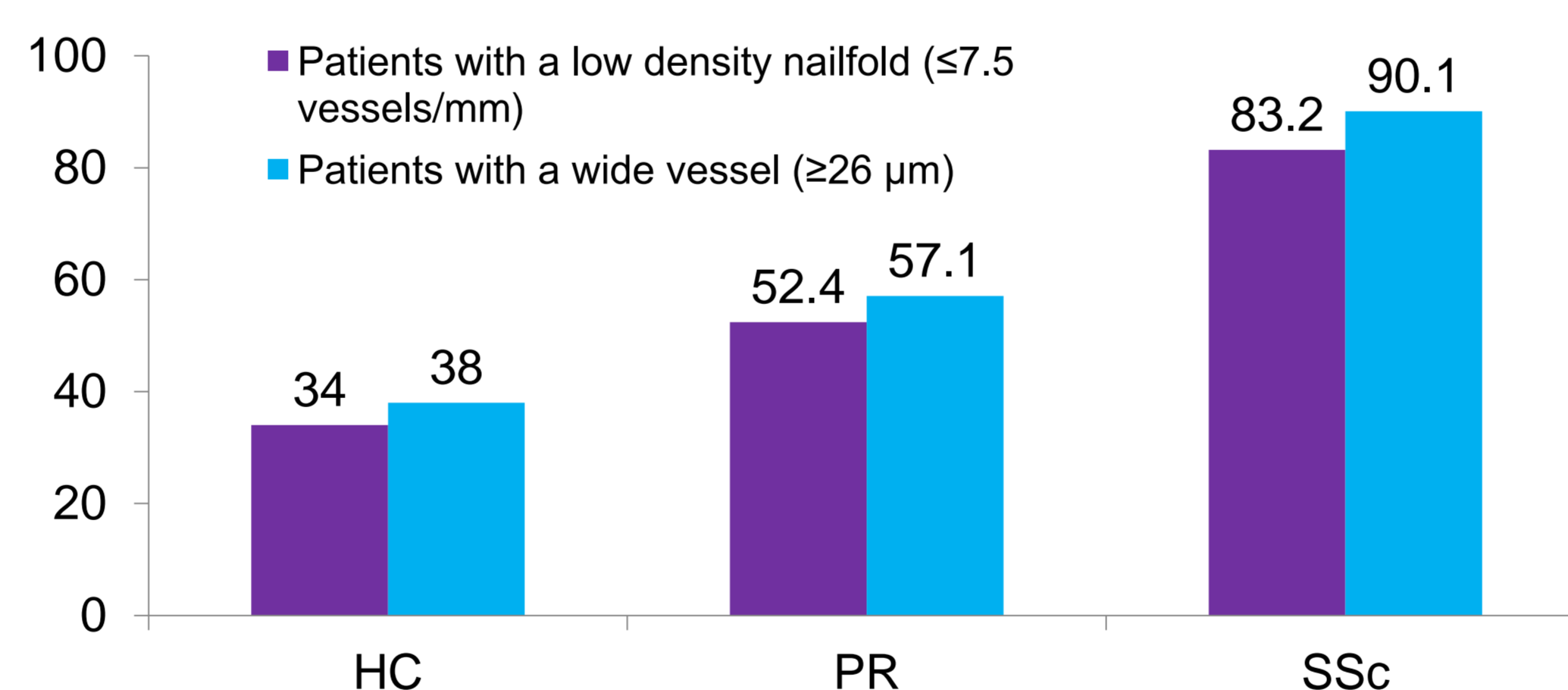


Figure 4. Prevalence (%) of wide vessels and low-density nailfolds, by patient group.

### Key findings: Vessel density

- The density of vessels also differed between groups: HCs had the highest density, followed by PR and SSc patients ( $p < 0.0001$ ) (Table 1).
- A density of 7.5 vessels/mm or less occurred in 8.7% of nailfolds belonging to healthy individuals, but in 47.1% of SSc nailfolds (Figure 3). We define this as an arbitrary threshold.
- Low-density nailfolds ( $\leq 7.5$  vessels/mm) appear in 34% of healthy controls, 52.4% of individuals with primary Raynaud's and 83.2% of SSc patients (Figure 4).

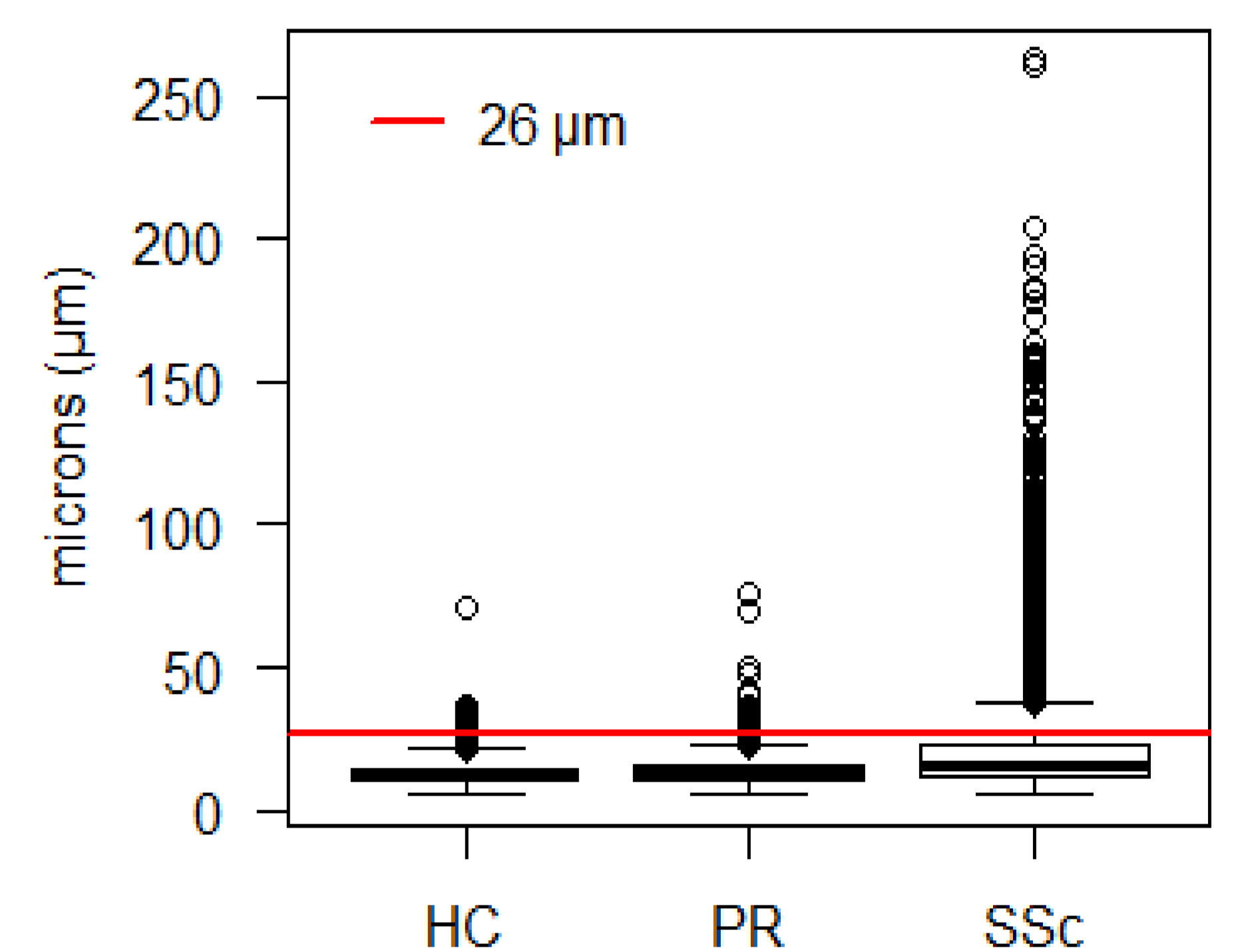


Figure 2. Distribution of vessel widths by patient group, showing  $26\mu\text{m}$  threshold (red line)

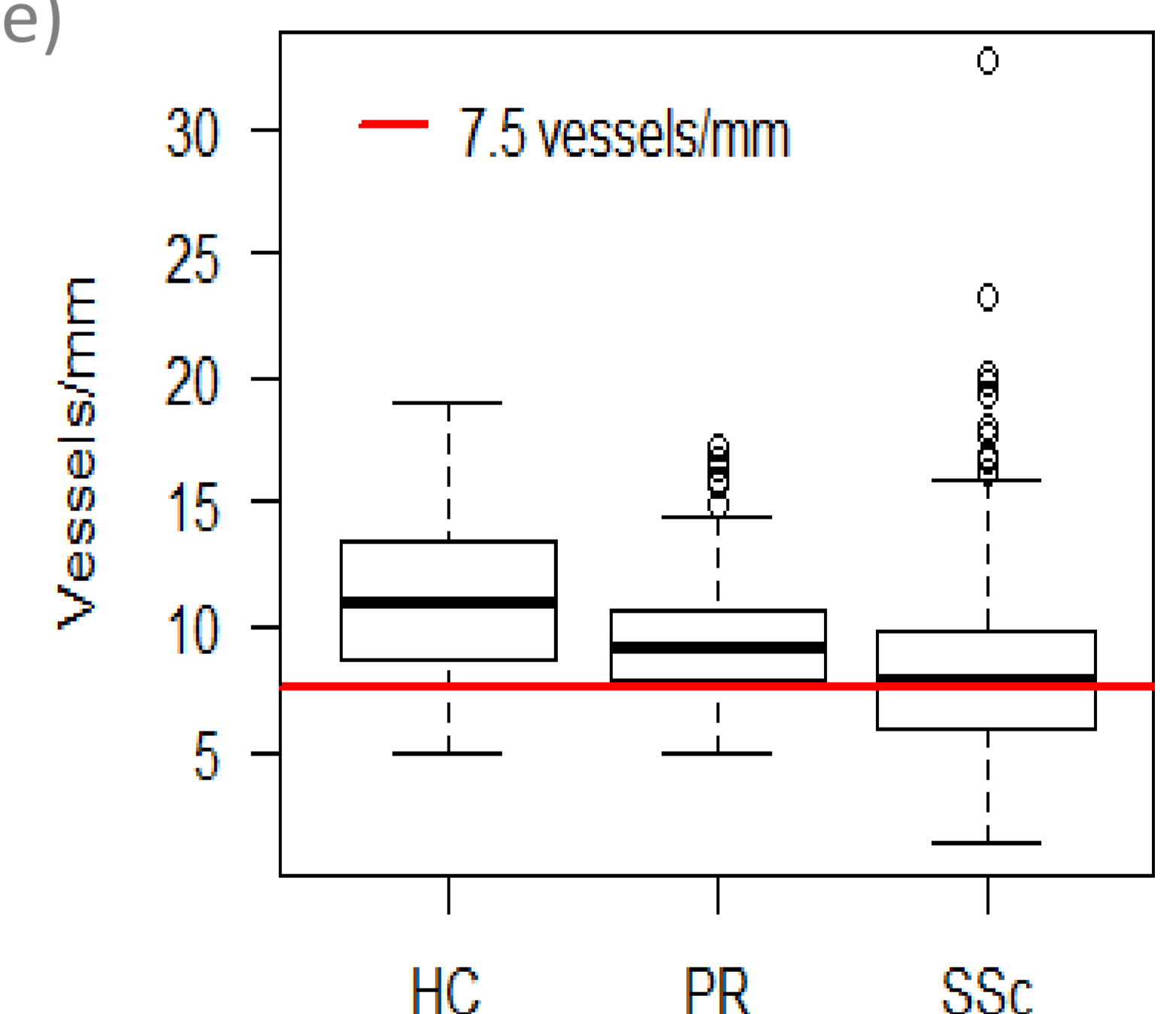


Figure 3. Distribution of vessel density by patient group, showing 7.5 vessels/mm threshold (red line)

## Conclusion

- Healthy individuals may have vessels as wide as  $26\mu\text{m}$  and nailfolds with densities as low as 7.5 vessels/mm, but this is unusual.
- **Key message:** These thresholds are an indicator for the possible range of vessel widths and densities in healthy individuals, but should not be used as absolute cut-offs to distinguish between healthy individuals and SSc patients.