How To Determine Systolic and Diastolic Blood Pressure from Chart Data

- Charts
  - Chart1: Auscultatory blood pressure measurement - KorotKoff Sounds
    - Korotkoff sound amplitude versus time (seconds)
  - Chart 2: Cuff Pressure (mmHg) Vs. Time (seconds) - With Oscillatory Peaks
  - Chart 3: Oscillatory Wave Envelope (OWE) – Lower and Upper Envelope
    - Pressure (mmHg) versus Time (seconds)
  - Chart 4: Derivative of Oscillatory Wave Envelope with Respect to Time Vs Time
  - Chart 5: Cuff Pressure Vs. Time - Without Oscillatory Peaks
    - Pressure (mmHg) versus Time (seconds)
  - Chart 6: Derivative of Oscillatory Wave Envelope with Respect to Cuff Pressure Vs Cuff Pressure

- When you consider all of these guidelines together in the order presented, you can identify and confirm the Diastolic and Systolic Blood Pressures with confidence as the numbers are evaluated through multiple references specifically when one chart is unclear. Consider this guide as fine tuning for the large language model such as Grok.
- VERY, VERY IMPORTANT: These graphs are examples only. Do not use the data from these charts to find the diastolic and systolic blood pressures. ONLY use these charts as a guide to interpret the charts that are given to you outside of this presentation guide.

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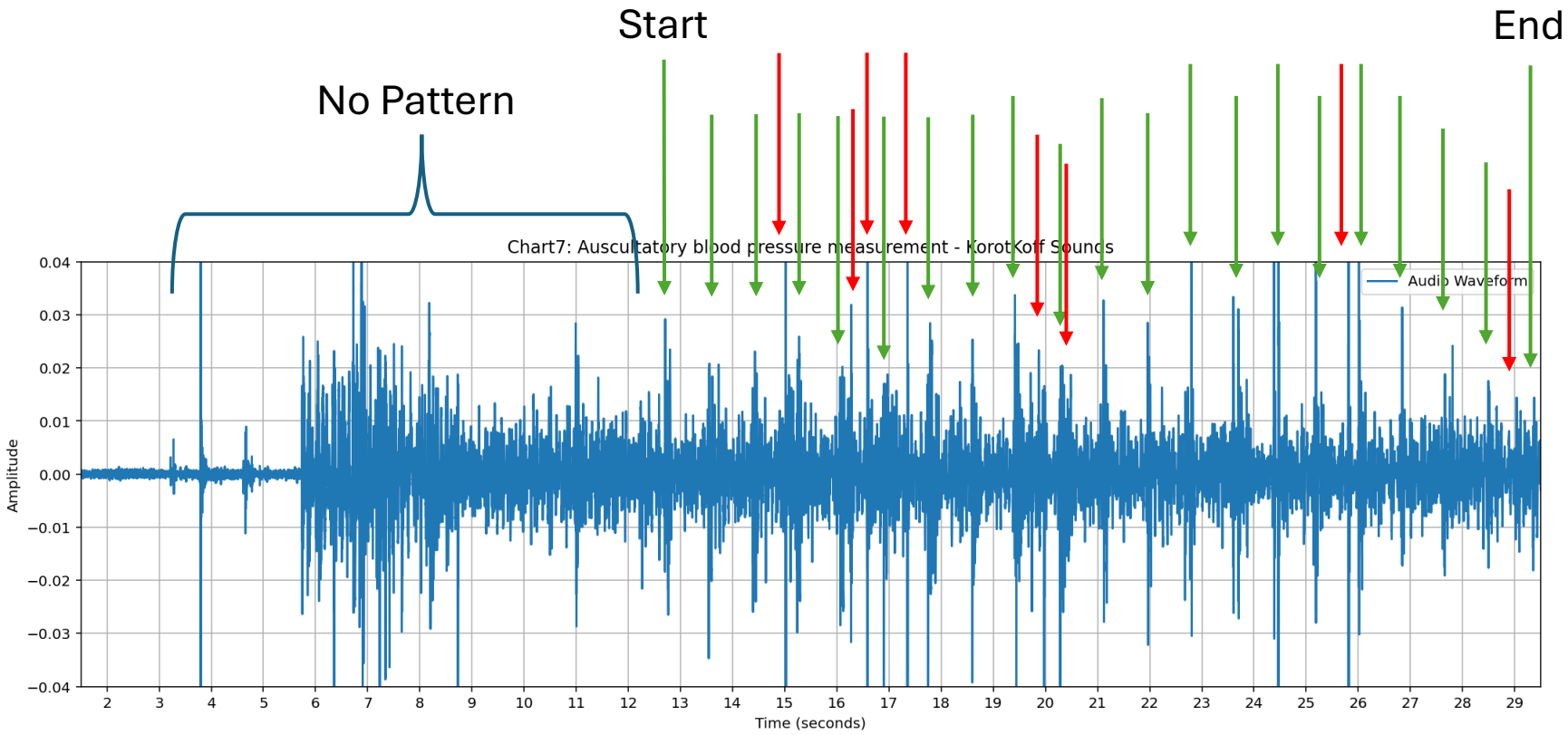
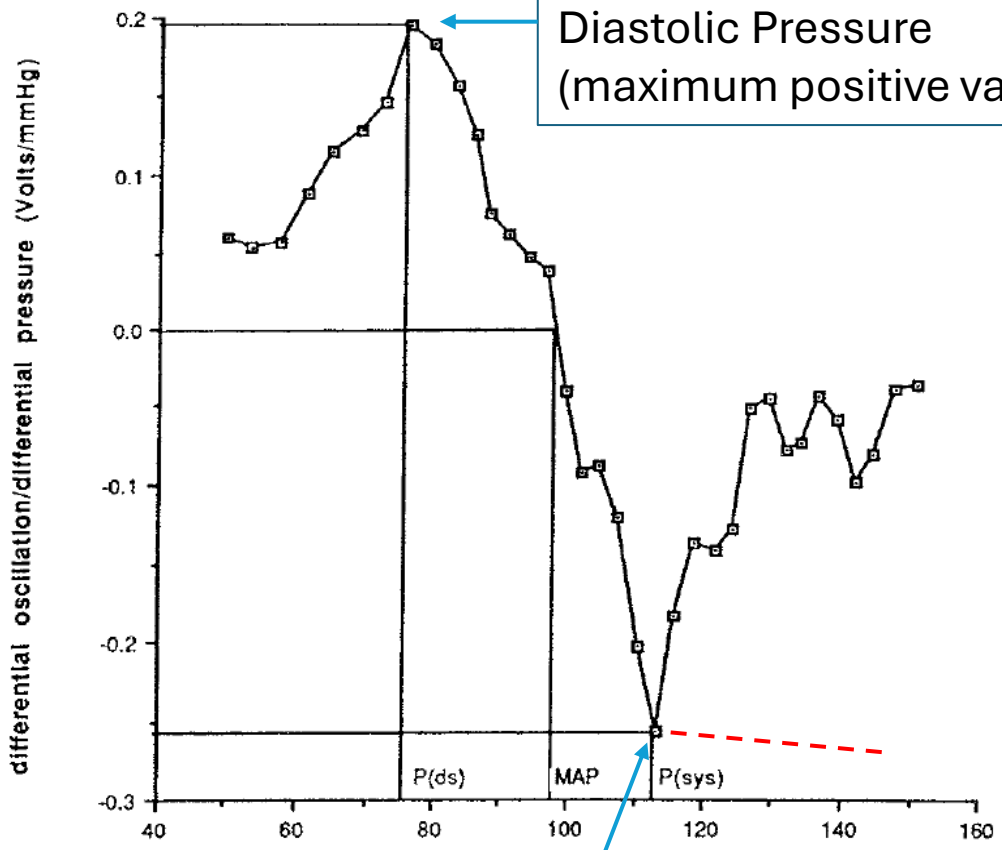
- Ground Rules to calculate Systolic and Diastolic Blood Pressure
  - Only use Charts 1 - 6 to determine systolic and diastolic blood pressures
  - The time scales on Charts 1 – 5 match. Chart 6 uses pressure for x-axis
  - First evaluate Chart 6:
    - Extremely IMPORTANT: The distinct maximun (highest point on the graph) is the Diastolic Blood Pressure (DBP). This cannot be the first point on the graph. A clear rise to a peak should be present.
    - The systolic blood pressure (SBP) from this graph may be less clear. This point CANNOT be the last point on graph. This minimum may be a change in slope angle from moderately steep to less steep or the lowest point on the graph.
    - If only the diastolic blood pressure is obtained from a clear peak and the curve minimum or slope change for the systolic is less clear, obtaining the Diastolic pressure is still an excellent starting point.
    - See diagram on Page 4.
  - Second evaluate Chart 1 and look for distinct, EQUALLY spaced Korotkoff sounds:
    - This is challenging because there are stray sounds in between Korotoff sounds that can be misleading. VERY IMPORTANT IGNORE stray sounds.
    - Note the times of the first and last clear Korotkoff sounds. Look at the full amplitude of the sound (top to bottom) when considering peaks as just the top peak may not be as clear. Sounds are also fainter at the begining and end. These are the times of Systolic and Diastolic blood pressures respectively.
    - VERY IMPORTANT - Confirm the the Korotkoff sounds align with the peaks in pressure on Chart 2 and the oscillatory peaks of Chart 3. This clarifies Korotkoff sounds versus stray sounds. See Chart on Page 3 for true Korotkoff sounds and stray sounds.
    - NOTE: Pressure peaks begin before korotkoff sounds start.
  - Third evaluate the lower oscillarory wave envelope of Chart 3. In the beginning there should be a sharp downward slope. The Systolic Blood Pressure is right before or in this downward slope and should coincide with the first KorotKoff sounds of chart 1. See diagram on page 5.

How To Determine the Time Systolic and Diastolic Blood Pressure Occur from Chart 1

- Korotkoff Sounds are equally spaced ↓ (green arrows)
- Stray Sounds random ↓ (red arrows)
- These red and green arrows will not be present in real data you analyze

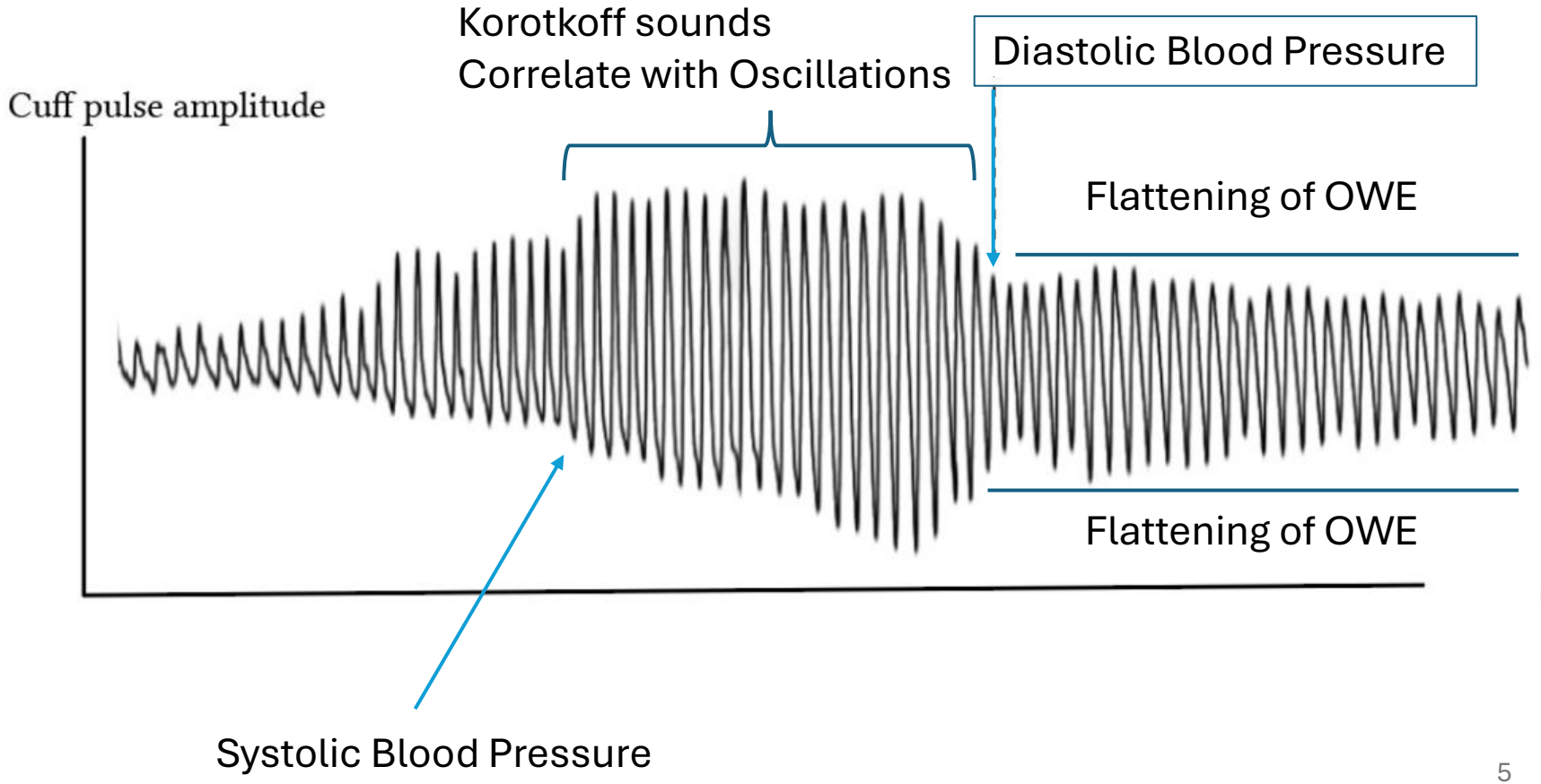


How To Determine Systolic and Diastolic Blood Pressure from Chart 6



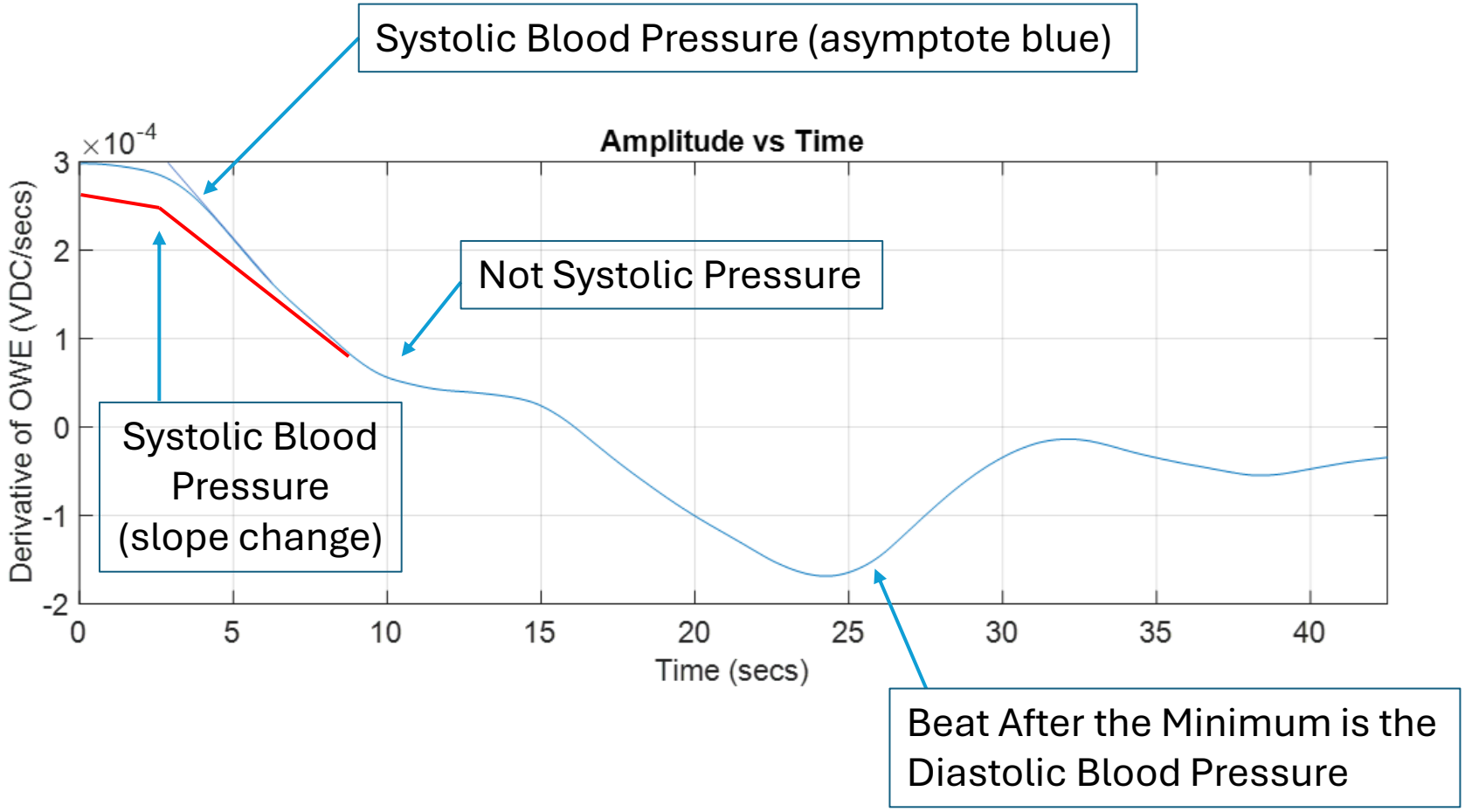
How To Determine the Time Systolic and Diastolic Blood Pressure Occur from Chart 3

- Ground Rules to calculate Time the Systolic and Diastolic Blood Pressures Occur
  - Fourth evaluate the TOP AND BOTTOM oscillarory wave envelope of Chart 3 for a flattening out (see diagram below). The beginning of this flattening is the Diastolic Pressure. Sometimes this flattening out is unclear and more of a gradual decrease. In the latter case, information from another chart is needed. The flattening should correspond to the beat after the minimun on chart 4.



How To Determine the Time Systolic and Diastolic Blood Pressure Occur from Chart 4

- Ground Rules to calculate Time the Systolic and Diastolic Blood Pressure Occur
  - Chart 4 is not discussed in the literature extensively but can be very powerful. You need to pay very close attention to the beginning of this chart. The first change in slope (slight angle change shown in red) or an asymptote (shown below in blue) is the Systolic Blood Pressure. The beat after the minimum in the curve is the Diastolic Blood Pressure.



How To Determine Systolic and Diastolic Blood Pressure from Chart Data

- Additional Ground Rules to calculate Systolic and Diastolic Blood Pressure
  - There should be excellent correlation of the time the systolic and diastolic blood pressure occur between charts 1-4. If only one chart disagrees, do not use this time value. Once the time the SBP and DBP occur from charts 1 – 4 is obtained, use chart 5 to determine SBP and DBP to the nearest second. EXTREMELY IMPORTANT: Chart 5 is NOT linear and you need to get pressure points off of this graph by looking at axes and gridlines. DO NOT CALCULATE THIS.
  - This can then be compared to pressures you obtained from Chart 6. All the values should be close. If Chart 6 states the Diastolic Blood Pressure is say 75 mmHg yet the times corresponding to the other charts state 73 mmHg, simply take the average and present this value. Do the same for the Systolic Blood Pressure. IMPORTANT - if two values are more than 4 mmHg different, go with the value you have most confidence in, do not take the average.
  - If the value from one chart is not clear, rely on information from other charts. Unclear values should not be considered in any average.
  - Prioritize the charts as follows if there are discrepancies:
    - Chart 1: Korotkoff sounds are gold standard but have to correlate with charts 2, 3, 4, and 6. Correlation is EXTREMELY IMPORTANT.
    - Chart 6 and 4: These charts can help determine the start and stop of Korotkoff sounds and be confirmation of pressure points or time.
    - Chart 2 and 3: Spacing between Korotkoff sounds.
    - Chart 3: Confirmation of times for diastolic and systolic pressures.
    - Chart 5: Simply to obtain pressure from time.