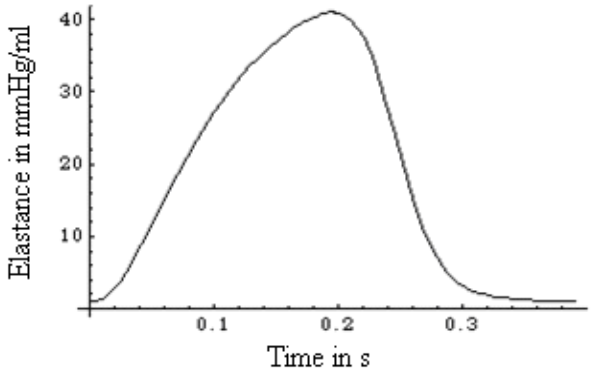
# Series 8 (8 April 2025)

Prof: Nikos Stergiopulos
TA: Sokratis Anagnostopoulos

## Chapter 14 : Pump Function

### Exercise 14.1

The graph below gives the variation of left ventricular elastance, *E*, over one heart beat as measured by Elzinga and Westerhof in an isolated cat heart model.




Experimental measurements on the isolated cat heart have given the following parameter estimates: $E_{max}$ = 40 mmHg/ml, $E_{min}$ = 0.5 mmHg/ml, $E_{mean}$ = 7.1 mmHg/ml and $V_d$ = 0.75 ml. Using the above information calculate:

1) End-diastolic volume, $V_{ed}$, for a venous pressure $P_{ed}$ = 5 mmHg.
2) The maximum pressure the ventricle can create against a clamped aorta (no ejection). Assume that filling (venous) pressure, $P_{ed}$, is the same as that for question 1.
3) Assuming that the mean cardiac output (left ventricular flow), $\overline{Q}$, when the heart pumps against zero load is 8.5 ml/s and using the experimental mean elastance value given above, construct an approximate pump function graph for the cat heart. Compare your results to the experimental pump function graph as given by Elzinga & Westerhof below: