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Inactive bears don't get blood clots like humans!

Blood clots are a common problem for humans who are sedentary. They frequently form in the veins of the legs and can then travel to the lung or brain causing serious complications, including death. This is frequently seen in critical care patients who are immobile for long periods or in surgery patients who are slow to return to their normal levels of activity.

Though it's not just humans that are immobile sometimes, for bears this is a normal part of their life! During hibernation, the black bear is immobile for a prolonged period of time, but as far as we can see, they do not suffer the same kinds of consequences as humans. So, we tried to learn from the bears! We are studying the blood components of bears that may protect them from these dangerous blood clots.

Test	Hibernating Bears (n=9)	Summer-Active Bears (n=23)	p-value	Human values (control)
PT (secs)	10.5 ± 0.8	9.6 ± 0.4	p = 0.01	12-13
aPTT (secs)	23.9 ± 3.3	14.3 ± 1.8	p < 0.001	25-35
KCT (secs)	58 ± 13	31 ± 5	p < 0.001	50-130
Fibrinogen (mg/dL)	230 ± 136	404 ± 101	p < 0.001	150-400
Plasminogen (%)	86 ± 11	136 ± 21	p < 0.001	200
Antithrombin (%)	84.2 ± 11.3	108.0 ± 9.2	p < 0.001	80-120
Antiplasmin (%)	69.4 ± 3.1	89.1 ± 8.8	p < 0.001	70
D-Dimer (ng/mL)	157 ± 172	208 ± 238	p = 0.56	<500
Protein C (%)	52.4 ± 3.9	58.1 ± 7.6	p = 0.04	65-135
vWF (%)	23.4 ± 5.7	39.6 ± 15.0	p < 0.001	50-200

Tab. 1. Mean and standard deviations of coagulation tests measuring "thinness" of blood in hibernating and summer-active bears.

So far we have found out that certain studies testing the "thinness" of blood, or measurements of a decrease in the propensity of the blood to clot, are changed when bears are hibernating (Tab. 1). This lets us know that there has been a shift in their internal regulation to help prevent blood clots. We already know that bears undergo many different changes while they are hibernating including a decrease in body temperature and lower metabolic rate. They also decrease their heart rate and respiratory rate. Even though these changes occur in the bears, they are similar enough to humans in terms of their weight and body temperature that we can learn from them.

The next steps for us will be to figure out how the bears make these changes in their blood. To do this, we are now studying more about their behavior, including the food that they eat and how that may affect their internal regulatory systems. We can also look at very tiny strands of genetic material to see if it exists in different amounts between bears that are hibernating and bears that are active. This might give us a clue as to which regulatory systems are turned on and help point us in the right direction. These steps could help keep us humans as safe as the bears when we are recovering from surgery or a long illness.

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