# Cancer as a manifestation of genetic memory?

Edgars Alksnis
e1alksnis@gmail.com

Recent interest in the so-called „Warburg effect" (Seyfrid et al., 2014; Christopherson, 2014) reminds, that something is missing from the global chain of reasoning.
Thus far we have:

1. the erythropoietic factor EPO gene is induced by hypoxia (Goldberg et al., 1988),
2. the first agent, which reacts to hypoxia, is the hypoxia-inducible factor 1 (Semenza, 1996),
3. the activity of hypoxia-inducible factor 1 can be found in different cell cultures, which do not produce EPO (Guillemin and Krasnow, 1997).

Perhaps the hypoxia-inducible factor can be understand best, when considering the changing atmospheric composition in Earth's past. Thus it was pictured by Holland (2006)(Fig.1):

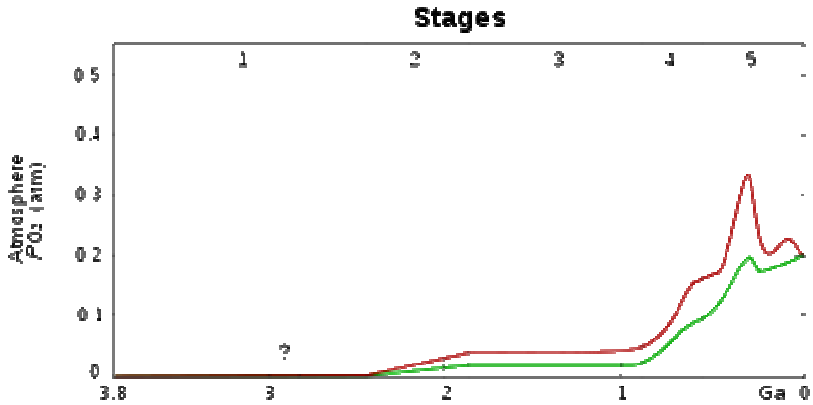


Fig.1 **$O_2$ build-up in the Earth's atmosphere.** Red and green lines represent the range of the estimates while time is measured in billions of years ago (Ga). (From Holland, 2006).
Stage 1 (3.85–2.45 Ga): Practically no $O_2$ in the atmosphere.
Stage 2 (2.45–1.85 Ga): $O_2$ produced, but absorbed in oceans and seabed rock.
Stage 3 (1.85–0.85 Ga): $O_2$ starts to flow out of the oceans, but is absorbed by land surfaces and formation of ozone layer.
Stages 4 & 5 (0.85 Ga–present): $O_2$ sinks filled, the gas accumulates.

For large epochs there were only about 3% oxygen in the atmosphere, but some 300 million years in the past there possibly were some 35%. Although exhausted athletes formally may have the same biochemical parameters as patients with advanced cancer, this similarity ends with fast recovery of athletes.
Perhaps the manifestation of cancer has deeper roots in our past?

**References**

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