Analysis of the FGF gene family provides insights into aquatic adaptation in cetaceans

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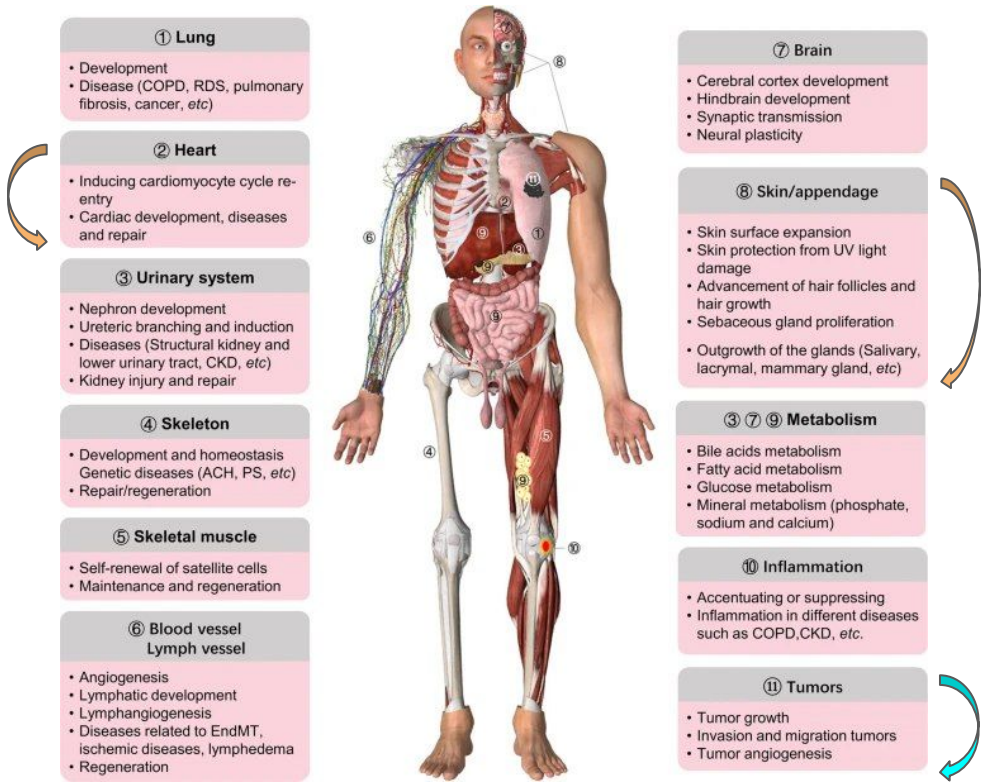
Why FGF

Fibroblast Growth Factor

FGF family:

FGFs:
FGF1
FGF2
.
.
FGF23



Pic.1 Main roles of FGF/FGFR signaling

FGF23

Nonsense mutations

FGF23 ↑

expression

Снижение минеральной плотности костей

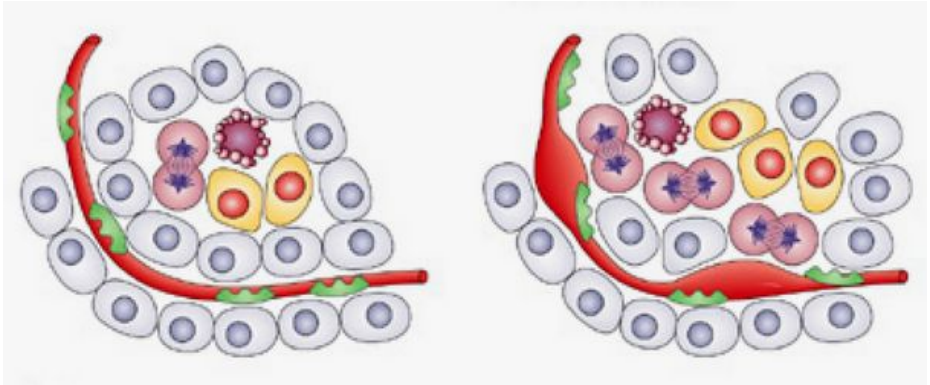
FGF11 ↑

expression

Устойчивость к гипоксии

Pic.2 Loss body hair due FGF23 mutations

- FGF1
- FGF2
- FGF3
- FGF4
- FGF5
- FGF6
- FGF7
- FGF8
- FGF9



Pic.4 Tumor development

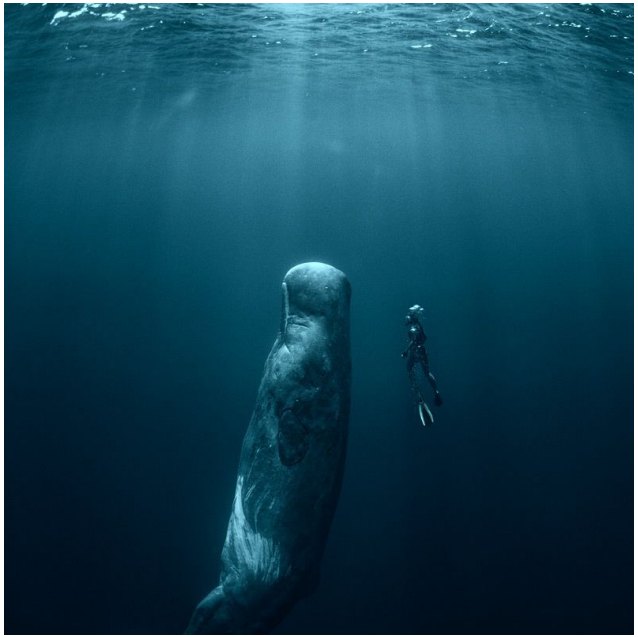
Associacion with resistance to targeted therapy in cancer and cancer risks

FGF23 ↑ expression

Снижение минеральной плотности костей

FGF11 ↑ expression

Устойчивость к гипоксии



Pic.3 FGF11, FGF23 roles

Methods

x8

x2

human

ClustalW in MEGA6

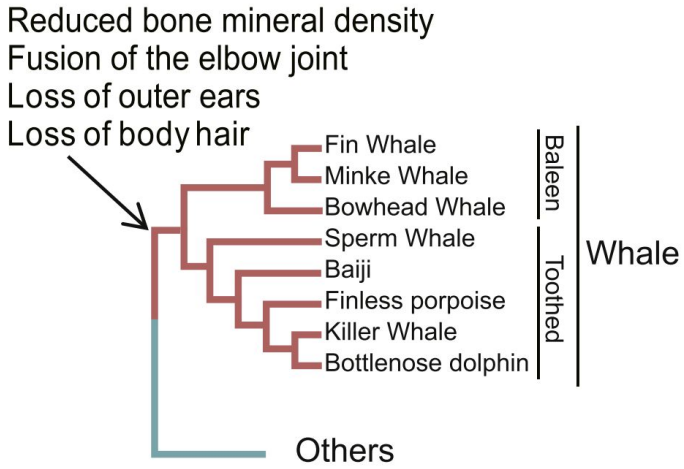
PRANK program[52] for the multiple sequence alignment

PolyPhen-2
PROVEAN v1.1
SIFT

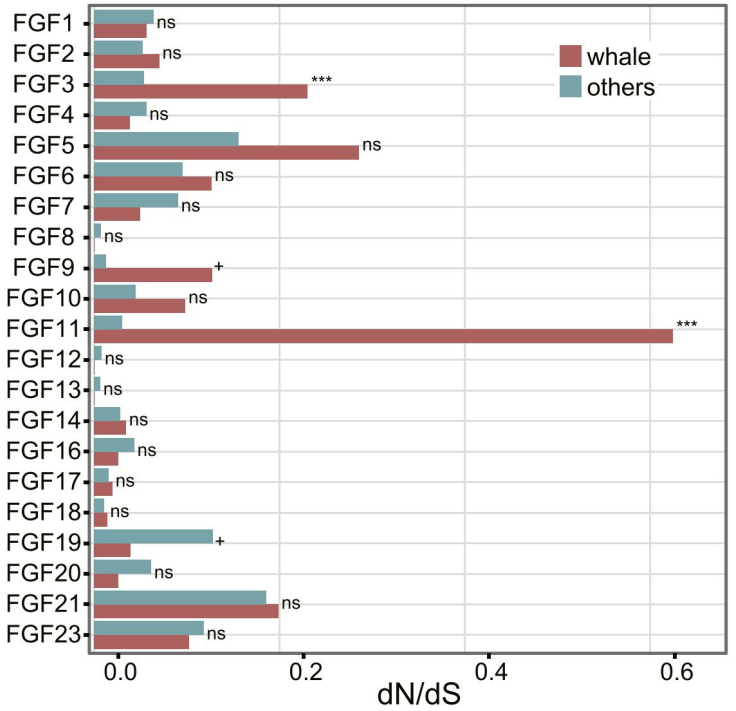
Results

FGF23	Higher number of HREs in the FGF23 promoter
FGF10 FGF20 FGF19 FGF21	Changes are linked with the evolution of the lung (FGF10), or kidney (FGF20), or with the metabolic changes (FGF19 and FGF21) required for aquatic life in cetaceans.

Evolutionary analysis of FGF genes



Pic.3 The species tree based on previous studies



Pic.4 The dN/dS ratio of whale branches (orange) and the other mammalian branches (turquoise) for each FGF gene. The ns, +, and *** denotes the significance level with p>0.1, p<0.1, and p<0.001, respectively.