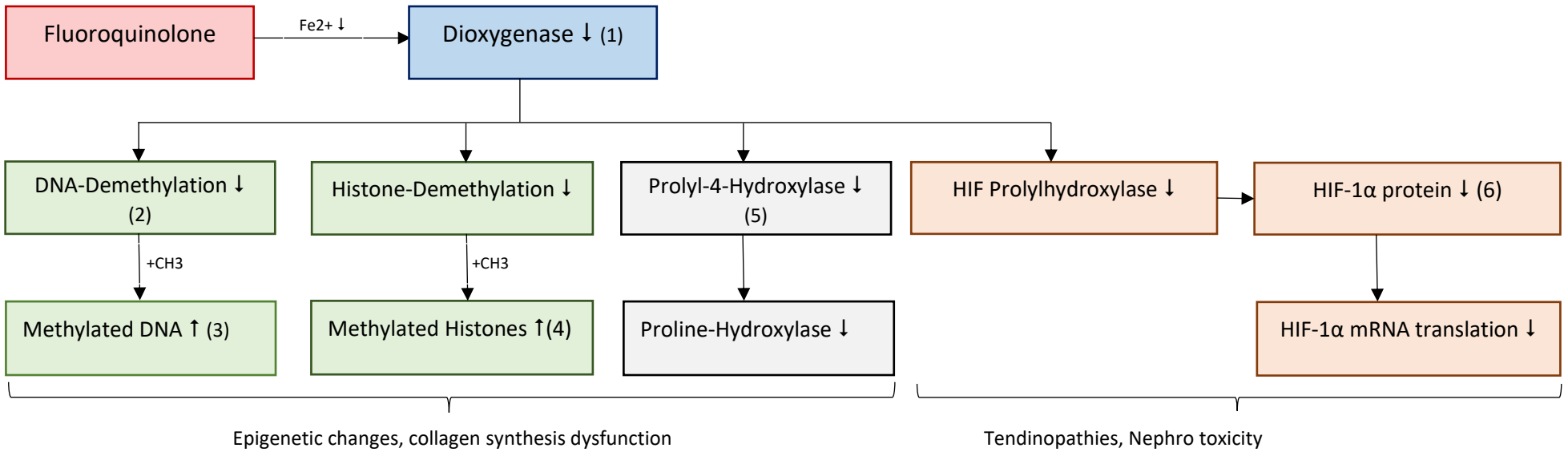
Fluoroquinolone-induced epigenetic changes and dysfunction of collagen synthesis

simplified process based on the study of Sujan Badal, Yeng F. Her and L. James Maher III by patrick.horisberger@fluorchinolone.info) .



(1) **Dioxygenases** are oxidoreductase enzymes. All organism depend on the oxidizing power of dioxygen in the majority of the metabolic pathways. The most widely observed cofactor involved in dioxygenation reactions is iron. Because of the strong iron chelating effect of Fluoroquinolones, the dioxygenase can be heavily inhibited and the oxygen transfer to important body functions like demethylation and collagen synthesis can be reduced.

(2) **Demethylation** is the chemical process resulting in the removal of a methyl group (CH3) from a molecule. A common way of demethylation is the replacement of a methyl group by a hydrogen atom, resulting in a net loss of one carbon and two hydrogen atoms..

(3) **DNA methylation** is a process by which methyl groups are added to the DNA molecule. Methylation can change the activity of a DNA segment without changing the sequence. DNA methylation typically acts to repress gene transcription. DNA methylation is essential for normal development and is associated with a number of key processes in our bodies. DNA methylation is not a DNA genetic mutation but a DNA modification or epigenetic change.

(4) **Histones** are highly alkaline proteins that package and order the DNA into structural units called nucleosomes. They are the chief protein components of chromatin, acting as spools around which DNA winds, and playing a role in gene regulation. Depending on the change of their basic structure, they can both induce or inhibit der gene transcription.

(5) **Prolyl hydroxylase** – also known as Procollagen-proline dioxygenase - is a member of the class of enzymes known as 2-oxoglutarate (2OG)-dependent dioxygenases. These enzymes catalyze the incorporation of oxygen into organic substrates through a mechanism that requires 2-oxoglutarate, Fe2+, and ascorbate. This particular enzyme catalyzes the formation of (2S, 4R)-4-hydroxyproline and is an essential contributor to the collagen biosynthesis.

(6) The **transcription factor HIF-1** plays an important role in cellular response to systemic oxygen levels in mammals. HIF-1 is known to induce transcription of more than 60 genes, including VEGF and erythropoietin that are involved in biological processes such as angiogenesis and erythropoiesis, which assist in promoting and increasing oxygen delivery to hypoxic regions.