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Use of turmeric as a health ingredient in the treatment of chronic inflammatory diseases

Morgan Le Rouzic^{1,2}, François Krier¹, Fabrice Coloma², Vincent Phalip¹, François Coutte¹ and Rozenn Ravallec¹

¹ Université de Lille, UMRt BioEcoAgro 1158-INRAE, Institut Charles Viollette, France
² Eurabiotech, France

Introduction

Turmeric is used as a spice and additive worldwide but its use in pharmaceuticals and nutraceuticals is growing. Thus, its interest in the scientific community is illustrated by the fact that turmeric is now cultivated and used as a health ingredient in herbal medicine on several continents according to ESCOP and EMA. In addition, clinical trials have shown that turmeric has a long-term therapeutic potential for chronic inflammatory diseases (CID), in addition to its beneficial adjuvant effect. The curcuminoids naturally present in large quantities in turmeric rhizome have several health effects in human and livestock, as illustrated in this work.

Traditionnal use and composition

Used in Ayurvedic medicine in India for 6000 years according to the FAO, turmeric is a plant whose traditional use is widespread in Asia [1]. Turmeric is part of the Zingiberaceae family, there are currently about 94 different species in the world [2]. Depending on the variety, the macronutrient composition of turmeric rhizome is characterized in **Figure A** [3, 4]. Turmeric is particularly rich in polyphenols. Chromatographic analysis of turmeric powder (Figure B) highlights the prevalence of the three major curcuminoids: curcumin, bisdemethoxycurcumin (BMC) and demethoxycurcumin (DMC).

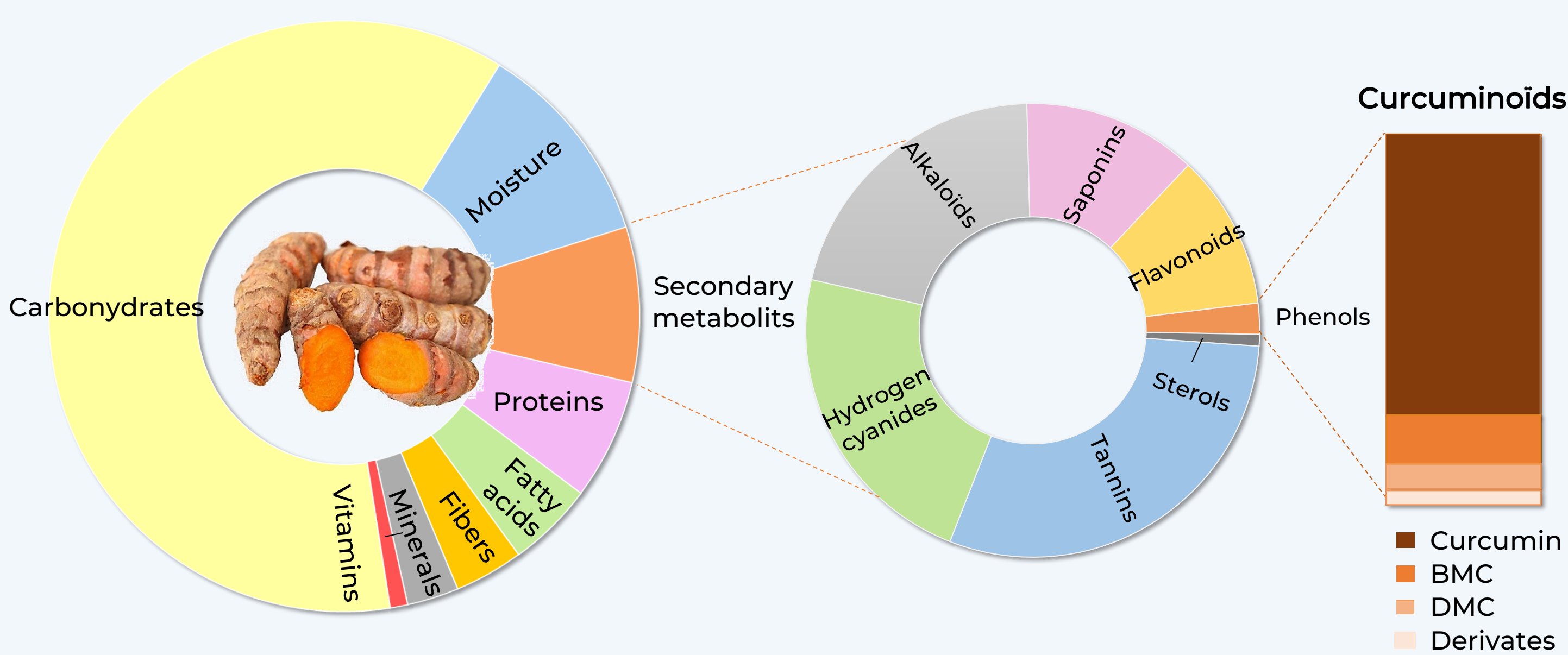


Figure A: Turmeric's macro- and micro-nutriments

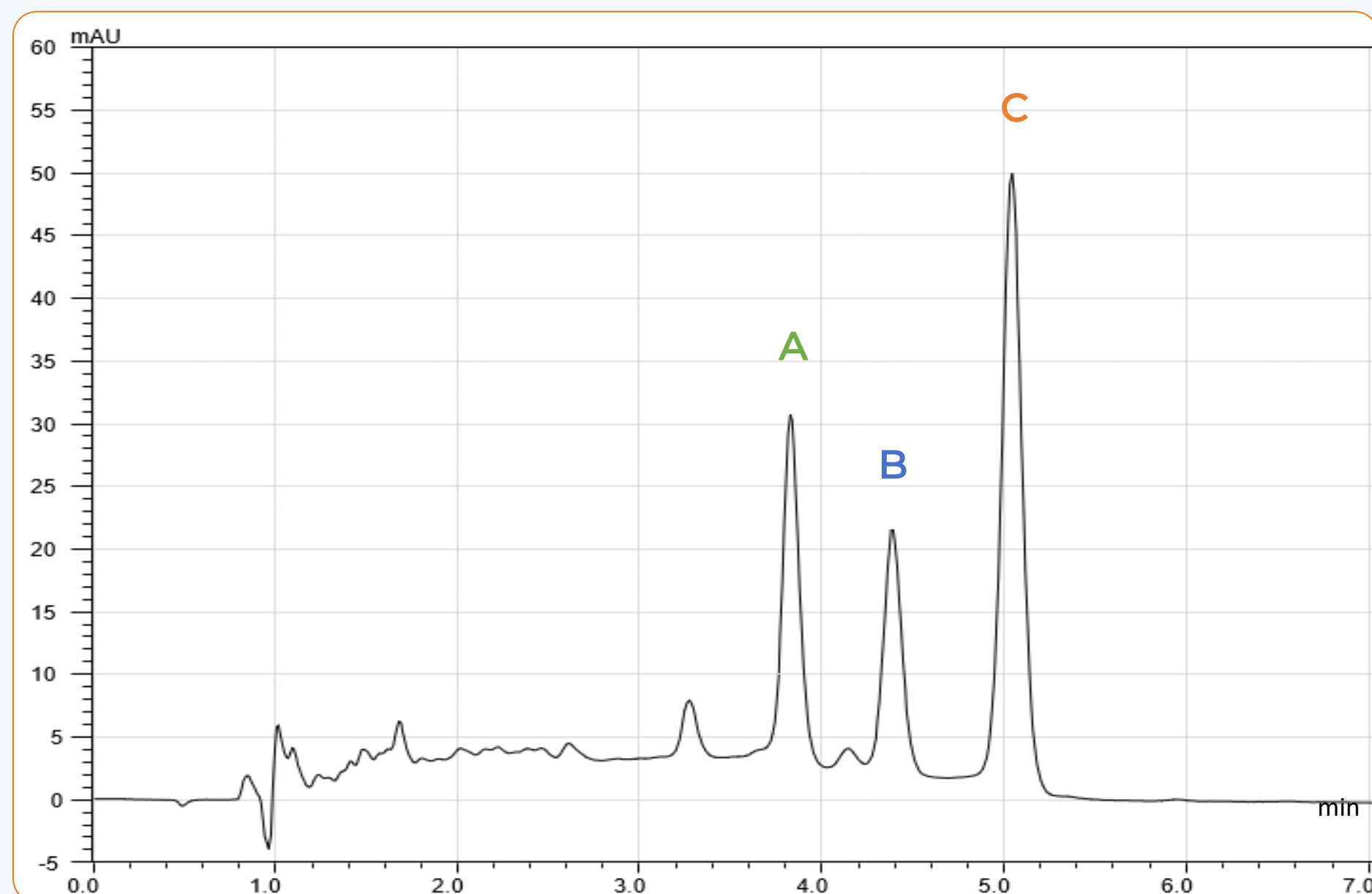
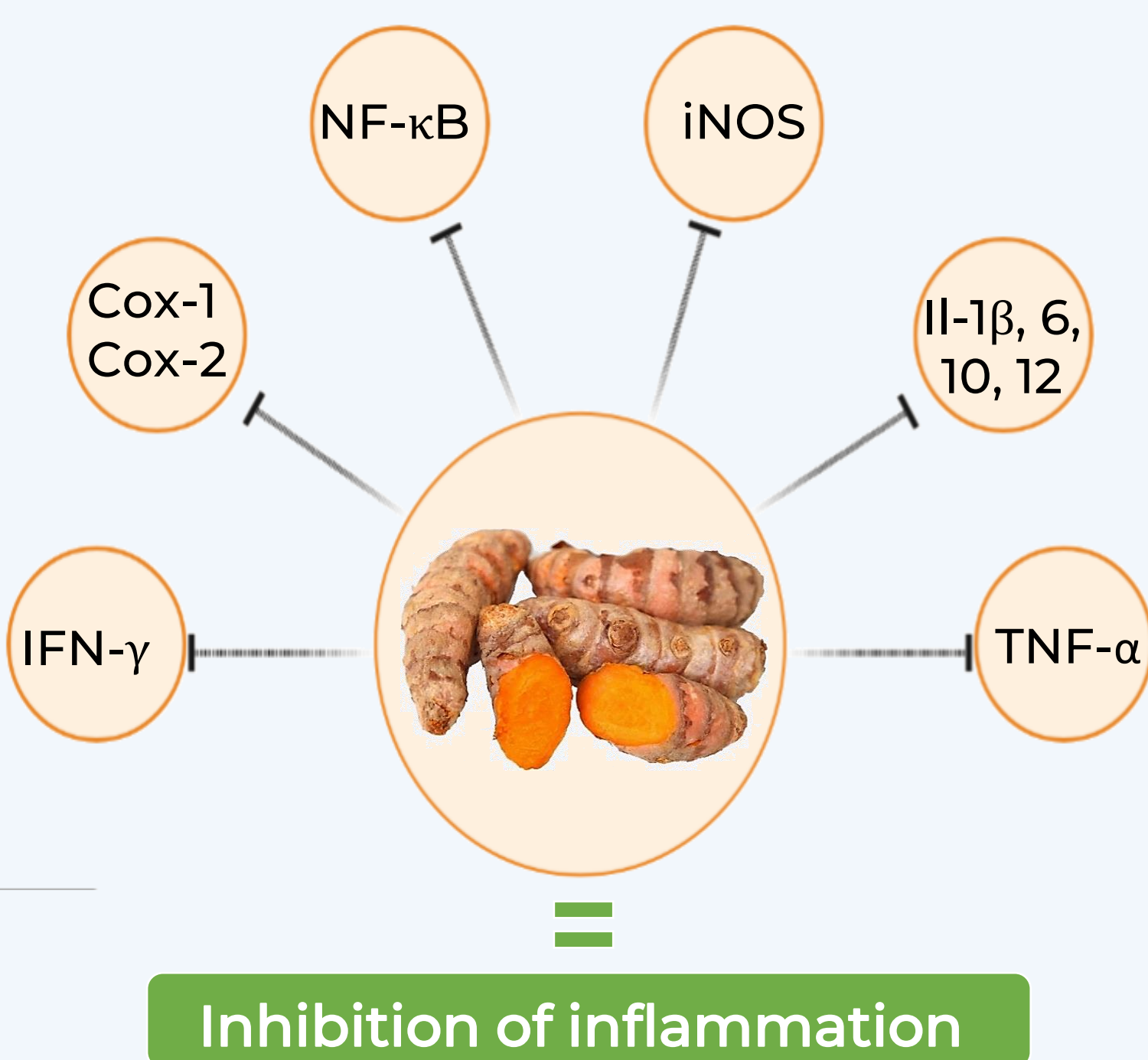


Figure B: Three major curcuminoids from turmeric powder analysed by HPLC

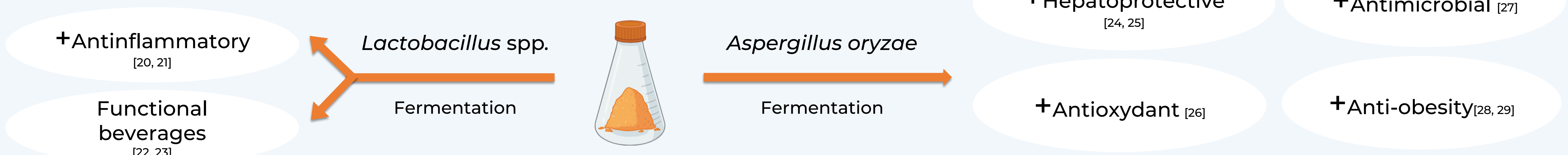
The 3 major curcuminoids in turmeric powder (1 g/l, MeOH) are identified by HPLC (PFP column, UV detector, 420 nm) : **BMC (A)**, **DMC (B)** and **curcumin (C)**, retention time respectively = 3.7 min, 4.3 min and 5 min.

Anti-inflammatory effect of turmeric and curcumin

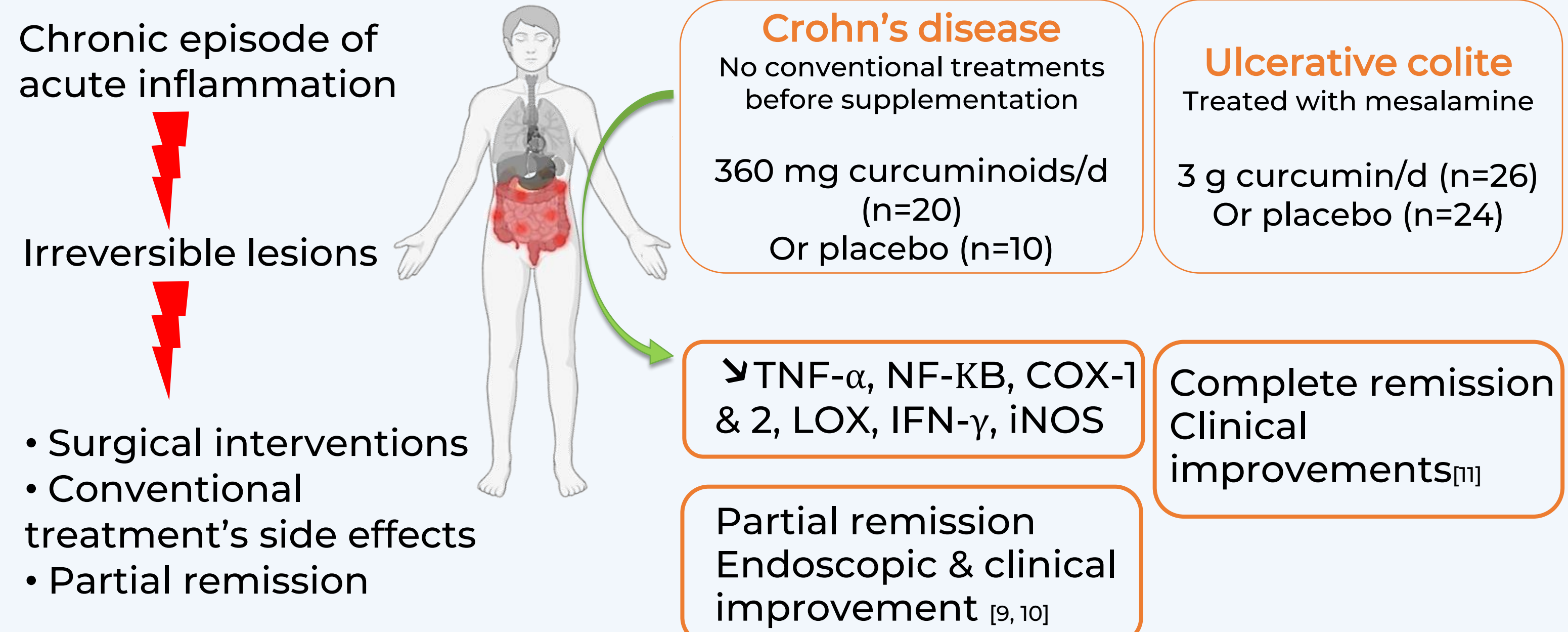


It is complicated to understand the mechanisms involved in CID because of the multifactoriality. Curcumin inhibits the action or secretion of some molecules as pro-inflammatory cytokines. It also binds to the MD2 receptor inhibiting the formation of TLR2-MD2, inducing the decrease of TLR4 membrane receptor synthesis and thus inhibiting the NFκB pathway [5, 6, 7, 8].

Fermented turmeric (FT) anti-inflammatory effect

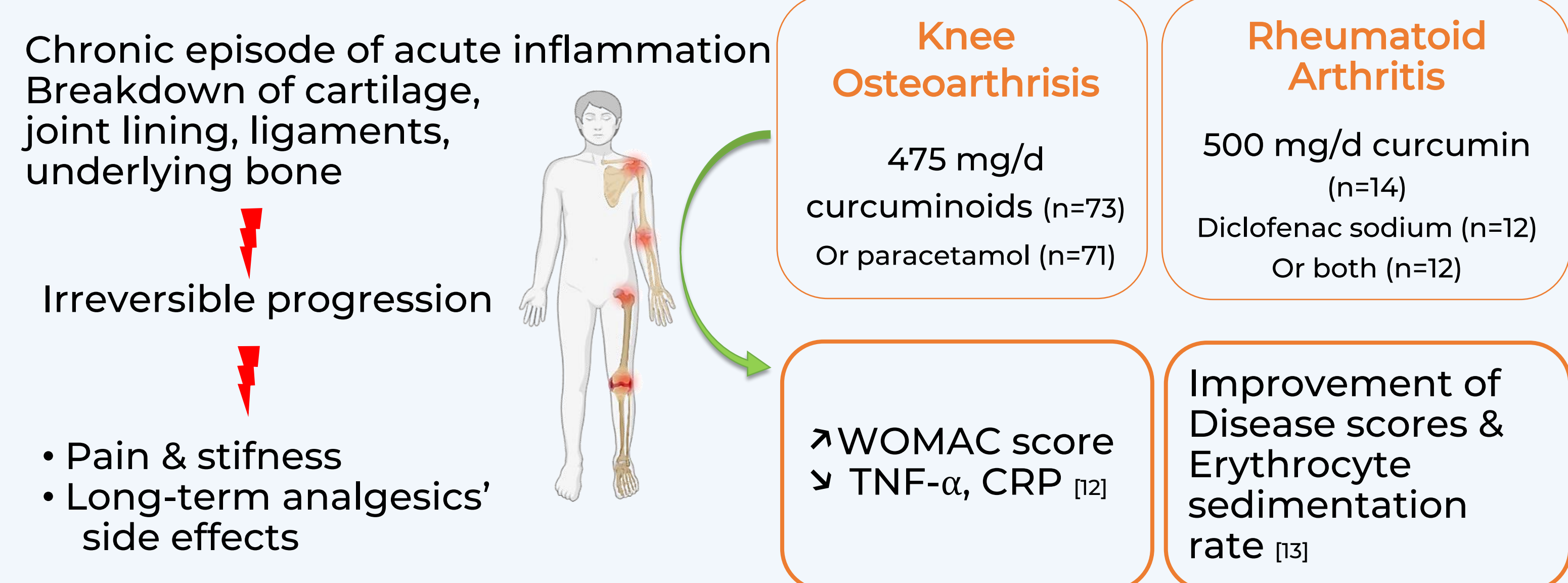


Turmeric in Inflammatory Bowel Diseases

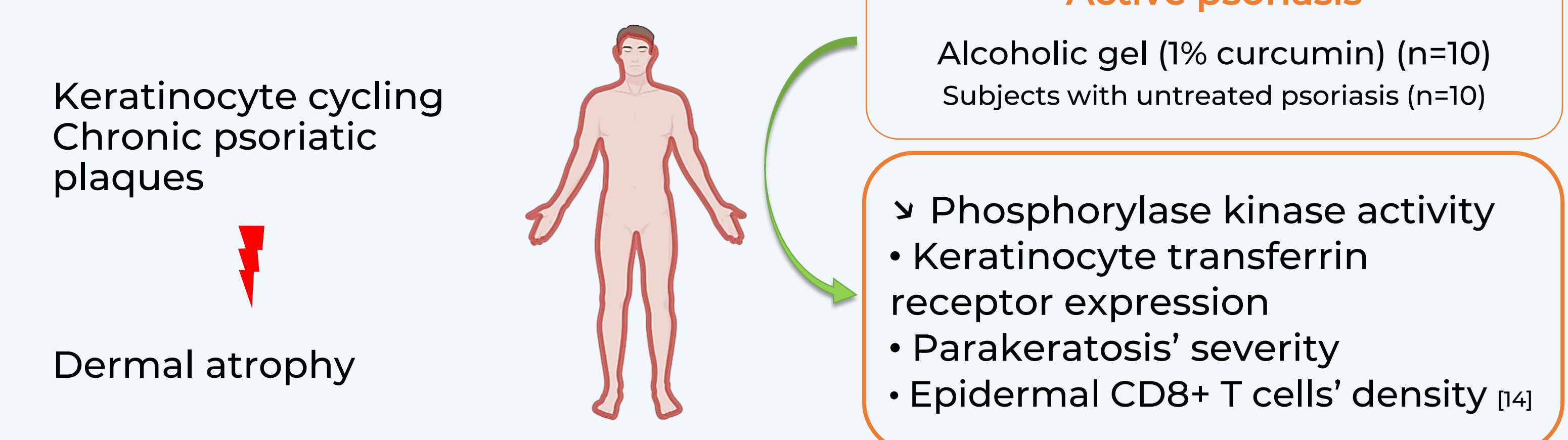


This highlights the therapeutic effects of turmeric, not only on the symptoms, but also on the remission of IBD patients.

Turmeric in rheumatism arthritis

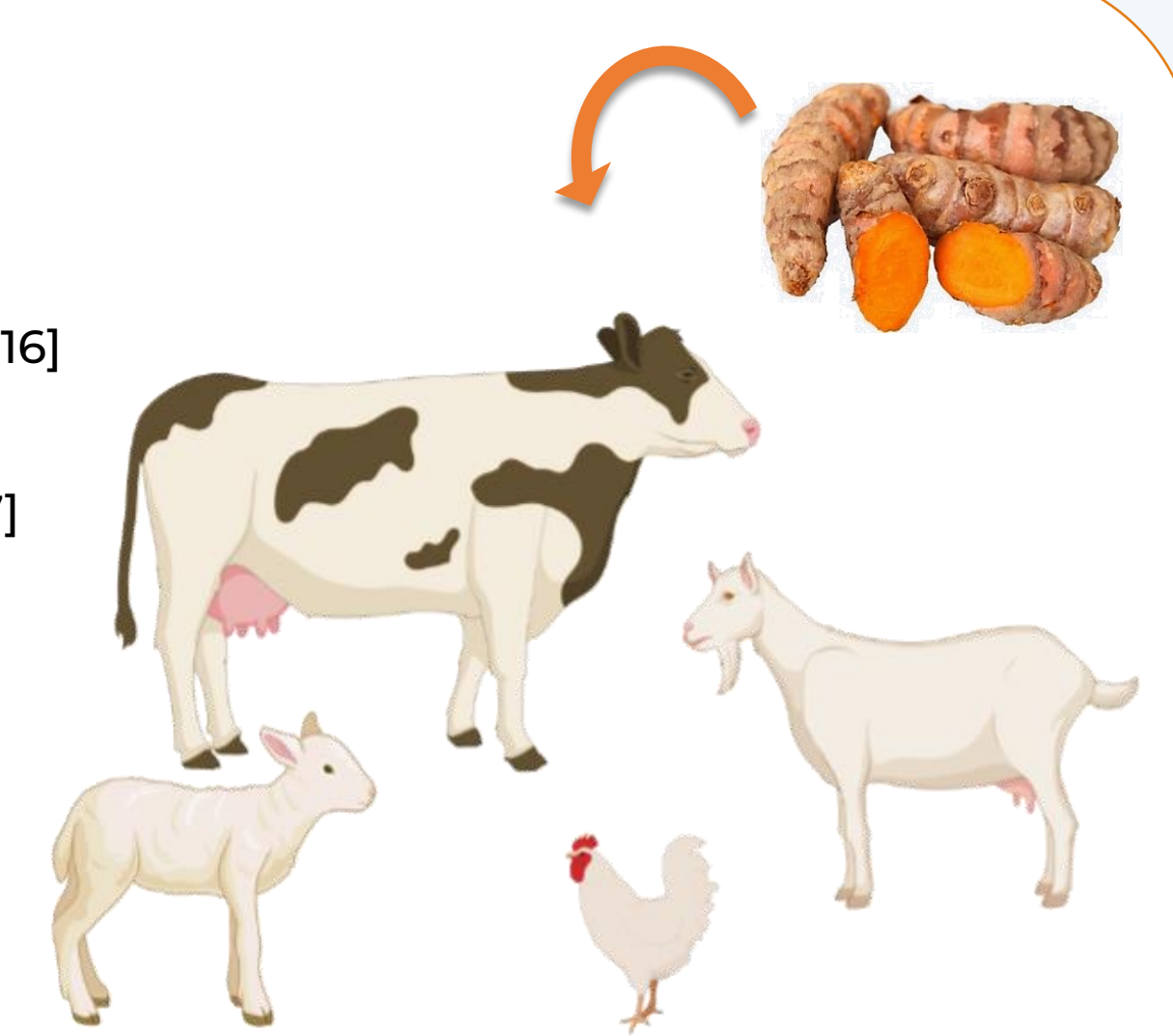


Turmeric in psoriasis



Turmeric in livestock

- Livestock's heat stress [15]
- Infertility (uterus of cows' inflammation) [16]
- Infections (goat's contagious ecthyma) [17]
- Feed conversion ratio value (broiler chickens) [18]
- Mortality [17, 19]



Conclusion and perspectives :

Turmeric or curcuminoids supplementation

Remission and improvement of clinical signs

Potential natural treatment to limit surgical interventions and the side effects of conventional treatments of CID

Despite these encouraging data in humans and livestock, the heterogeneity of duration, dosage and number of subjects require further trials to confirm turmeric and FT as therapeutic agents in CID.