# Chronic and unresolved inflammation





# SPECIALISED PRO-RESOLVING MEDIATORS (SPMs) are lipid mediators

synthesised from omega-3 fatty acids EPA and DHA, that PROMOTE THE RESOLUTION OF INFLAMMATION

# **AGEING AND CHRONIC**

**INHIBIT OUR ABILITY TO PRODUCE MEDIATORS** necessary for the resolution of inflammation<sup>4</sup>

#### HERBAL AND NUTRIENT ACTIONS IN PAIN AND INFLAMMATION THE RESOLUTION **OF INFLAMMATION** Agonist · PEA SPMs promote the resolution of inflammation by reducing EPA/DHA **Cell Membranes** PPAR-a PGE<sub>2</sub> neutrophils and promoting efferocytosis (cellular debris Omega-3 Anti-inflammatory clearance) ·Fish oil Inflammation ·Krill oil Omega-6 Oxidative stress ·Herring roe - Smoking stress - Ageing Neutrophils GLA/DGLA **Inhibitors** Arachidonic acid Curcumin ↑ Leukotrienes † Prostaglandins ROS Lipoxygenase (LOX) Cyclooxygenase (COX) PGE. **Inhibitors** Anti-inflammatory · Curcumin **Inhibitors** ON **Inhibitors** ·Boswellia ·SPMs · Curcumin Lipid mediator class switch **Inhibitors** ·Saffron ·Ginger · Curcumin · Quercetin ·PEA ·Ginger ·Zinc ·Zinc ·Boswellia ·Saffron **SPMs** Excessive accumulation Natural or of pro-inflammatory cells NFkB supplemental Leukotrienes - Age-related diseases - Cell proliferation - Inflammation COX-1 COX-2 - Alleray **Apoptotic Inhibitors Inhibitors** - Gastric damage neutrophils · Vitamin D - Bronchospasm · Curcumin ·PEA Increased permeability Efferocytosis ·Boswellia Omega-3 Resolvina macrophages **Inhibitors** IL-6 TNF LTA, LTB<sub>4</sub> LTC. LTD<sub>4</sub> LTE<sub>4</sub> ·Zinc - Cell proliferation Inflammation ·Vitamin D - Inflammation ·Omega-3 Resolvins **Impaired** - Bone resorption - Proteoglycan Uterine muscle contraction **Inhibitors SPM Biosynthesis** protectins - Rheumatoid arthritis degradation ·Vitamin D (cartilage loss) Resolution of Failed resolution **Prostacyclins Thromboxanes** PGI<sub>2</sub> PGE, inflammation of inflammation - Vasodilation - Vasoconstriction - Gastric protection - Inflammation - Pain - Decrease platelet - Increase platelet - Uterine contractions aggregation aggregation - Renal function - Fever Chronic **Homoeostasis** - Decrease platelet - Vasodilation Inflammation - Cell proliferation aggregation

## **KEY HERBS AND NUTRIENTS** IN CHRONIC AND **UNRESOLVED**

INFLAMMATION:

- Specialised pro-resolving mediators (SPMs)\*
- Omega-3 fatty acids
- Palmitoylethanolamide (PEA)
- Vitamin D
- Quercetin
- Curcumin
- Boswellia serrata (boswellia)
- Crocus sativus (saffron)
- Zingiber officinale (ginger)

## \*Types of SPMs

- Lipoxins
  - Resolvins
- Protectins Maresins

### **CLINICAL SIGNS OF UNRESOLVED** INFLAMMATION:3

- Pain, arthralaia and myalgia
- Fatique
- Insomnia
- Depression, anxiety and mood disorders
- Gastrointestinal complaints
- Obesity or overweight
- Frequent infections and illness