

Peptide Immunotherapy

COLOSTRUM

A Physician's Reference Guide

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Andrew M Keech, PhD

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Colostrum—A Physician's Reference Guide

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Description: Macrophage engulfing bacteria. Computer artwork of a macrophage white blood cell (green) engulfing bacteria (gold). This process is called phagocytosis. Macrophages are immune system cells that phagocytose and destroy pathogens, dead cells and cellular debris. After phagocytosis they display fragments of a pathogen's proteins on surface receptors to direct other cells to attack the pathogen.

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pep·tide

Pronunciation [pep-tahyd]

–noun, a compound containing two or more amino acids in which the carboxyl group of one acid is linked to the amino group of the other.



im·mu·no·ther·a·py

Pronunciation [im-yuh-noh-ther-uh-pee]

–noun, treatment designed to produce immunity to a disease or enhance the resistance of the immune system to an active disease process, as cancer.

TABLE OF CONTENTS

| | |
|---|-----------|
| PREFACE..... | 15 |
| INTRODUCTION..... | 18 |
| PART I: COLOSTRUM | 21 |
| CHAPTER 1 | 22 |
| What Is Colostrum?..... | 22 |
| What Are the Legal vs Actual Definitions of Colostrum?..... | 23 |
| CHAPTER 2 | 25 |
| A Brief History of Colostrum..... | 25 |
| CHAPTER 3 | 27 |
| Doug and Kaye Wyatt's Story..... | 27 |
| The Rediscovery of Colostrum..... | 27 |
| CHAPTER 4 | 35 |
| What Is Colostrum Good For?..... | 35 |
| Intestinal Permeability..... | 36 |
| Leaky Gut Syndrome (LGS)..... | 37 |
| Immune Health..... | 39 |
| Diabetes..... | 43 |
| Autoimmune Conditions..... | 45 |
| Autism..... | 46 |
| Heart Disease..... | 46 |

| | |
|--|----|
| Influenza | 47 |
| Cancer..... | 47 |
| AIDS (HIV Virus)..... | 49 |
| Athletic Use..... | 50 |
| Fitness | 51 |
| Anti-Aging | 53 |
| Detoxification | 54 |
| Weight Loss | 55 |
| Healing, Tissue Repair and Recovery from Injury..... | 56 |
| Topical Applications | 57 |
| The Perfect Food..... | 57 |
| Colostrum as Functional Food..... | 60 |
| In Summary..... | 60 |
| CHAPTER 5 | 61 |
| Collection and Processing..... | 61 |
| Coating the Colostrum Powder with Various Phospholipids..... | 64 |
| CHAPTER 6 | 67 |
| What's in Colostrum?..... | 67 |
| Immune Components..... | 67 |
| Immunoglobulins | 67 |
| Immunosupplementation of the Gut..... | 69 |
| Bovine Immunoglobulins..... | 70 |
| Bovine Secretory Immunoglobulin A (sIgA)..... | 73 |
| Antibacterial/Antiviral Activity..... | 74 |
| Anti-inflammatory Activity..... | 75 |
| Stability..... | 76 |
| Other Immune Factors | 78 |
| Complement..... | 78 |
| Lactoferrin | 79 |
| Lysozyme | 80 |
| Lactoperoxidase..... | 80 |
| Growth Factors..... | 80 |

| | |
|--|----|
| Lactalbumin..... | 84 |
| Lactobacillus, Bifidus, Acidophilus..... | 84 |
| Vitamins and Minerals..... | 84 |
| Sulfur..... | 84 |
| Enzymes..... | 84 |
| Trypsin Inhibitors and Protease Inhibitors | 85 |
| Lymphokines..... | 85 |
| Oligopolysaccharides and Glycoconjugates | 85 |
| Orotic Acid..... | 85 |
| Neurotransmitters..... | 85 |
| Cytokines..... | 85 |
| Chemokines | 88 |
| Proline-rich Polypeptides (PRPs)..... | 88 |
| Defensins | 89 |
| Soluble CD14..... | 89 |
| Toll-like Receptors | 90 |
| Cathelicidin-derived Antimicrobial Peptide..... | 90 |
| Glycoproteins..... | 90 |
| Kappa-caseino Glycomacropeptide..... | 91 |
| Fatty Acid Binding Protein..... | 91 |
| Orosomucoids..... | 91 |
| Clusterin (Apolipoprotein J) | 91 |
| Haemopexin | 91 |
| Haptoglobin..... | 92 |
| Sporozite Inhibitory Lipid (SIL)..... | 92 |
| Nucleotides | 92 |
| Hormones..... | 93 |
| Cardiovascular Health | 94 |
| Digestive Enzymes and Proteins..... | 95 |
| Fats | 96 |
| CHAPTER 7 | 98 |
| Yes, But Does It Work? | 98 |
| Gut Health..... | 98 |

Colitis 98
 Ulcerative Colitis 99
 Irritable Bowel Syndrome..... 99
 Immune System..... 100
 Colds and Flu..... 100
 Staph Infection..... 100
 Fever of Unknown Origin..... 102
 Herpes and Hashimoto's Disease 102
 Mononucleosis..... 103
 Diarrhea and Dysentery..... 103
 Down Syndrome and Diarrhea 103
 Inflammation 104
 Bursitis..... 104
 Scalp Inflammation 105
 Brown Recluse Bite..... 105
 Poison Oak..... 105
 Autoimmune Disorders 106
 Chronic Fatigue 106
 Chronic Fatigue Syndrome/Fibromyalgia..... 106
 Crohn's Disease..... 107
 Multiple Sclerosis..... 108
 Arthritis and Bone Disease..... 108
 No More Scooters..... 109
 Osteoporosis..... 109
 Of Cats and Sunburn..... 110
 Allergies 111
 Asthma and Allergies..... 111
 Hives..... 111
 Warts 112
 Hemophilia..... 112
 Cognitive Disorders and Alzheimer's..... 113
 Brain Damage..... 113
 Cancer..... 113
 Injury Recovery and Wound Healing..... 114

Athletics..... 115
 Muscle Building at 70..... 115
 Pet Health 115
 Elderly Pets 115
 Testimonial Snippets about PRP Spray..... 116
 A Collection of Letters from Richard Kolt of Tucson, AZ..... 117
 Professional Testimonials..... 123

PART II: PROLINE-RICH POLYPEPTIDES..... 129

CHAPTER 8..... 130

Bovine Liquid Colostrum with PRPs: A Physician's Clinical Experience
 with Autoimmune Diseases and Other Conditions..... 130
 How I Discovered Bovine Colostrum 134
 The History of Colostrum and Transfer Factor 138
 Anne: In Need of an Immune Boost 139
 Monique: Colonized by Dangerous Staph Infection (MRSA)..... 142
 Cold Sore Help..... 143
 Amy: An Immune System Out of Balance 143
 Marlene: Help with Lupus-Related Exhaustion..... 146
 Corina: Fibromyalgia, Osteoarthritis and Chronic Fatigue..... 147
 Tammy: Multiple Sclerosis Help 148
 Support for Those With HIV/AIDS..... 148
 Alex: Raging PMS 149
 Side Effects and Warnings..... 150

CHAPTER 9..... 152

What Are Proline-rich Polypeptides? 152

CHAPTER 10..... 155

Structure of PRPs..... 155

CHAPTER 11..... 164

Signal Transduction..... 164

CHAPTER 12..... 167

The Role of PRPs in Th1/Th2 Cytokine Balance..... 167

 Role of Th1, Th2..... 167

 Cancer, Cell-mediated Immunity, and PRPs..... 170

 Viral Infections..... 171

 Chronic Fatigue..... 174

 The Treatment..... 174

 PRPs and Other Alternative Therapies..... 175

 Conclusion..... 176

CHAPTER 13..... 177

Benefits of PRPs..... 177

CHAPTER 14..... 183

PRPs and AIDS..... 183

 What Are Natural Killer Cells?..... 189

CHAPTER 15..... 191

Frequently Asked Questions about Proline-rich Polypeptides..... 191

 How do PRPs work?..... 191

 How was the active component (PRPs) discovered?..... 191

 Is blood the only source of PRPs?..... 192

 What is the actual definition of infopeptides?..... 192

 What prompted these scientists to look for PRPs in colostrum?..... 192

 Can these infopeptides be as effective for adults
 as for a newborn infant?..... 193

 Can we get enough human colostrum to provide
 enough of the infopeptides?..... 193

 What is meant by the phrase, "No clear relationship
 between dose and benefit"?..... 193

 What do these infopeptides do for adults, anyway?..... 193

 What specific types of conditions are likely to respond to PRPs?..... 194

 What types of conditions are least likely to respond to PRPs?..... 194

 How are PRPs administered?..... 194

How much is needed to be effective?..... 194

Are PRPs safe?..... 194

Should I take PRPs as a preventive?..... 194

Since PRPs are isolated from colostrum, what about
 milk allergies and lactose intolerance?..... 196

How do PRPs compare to the colostrum products
 that are on the market now?..... 196

Are PRPs only good for newborns?..... 196

Have PRPs been scientifically validated?..... 197

What conditions are responsive to PRPs?..... 197

If PRPs are so effective, why hasn't the pharmaceutical
 industry jumped on PRPs?..... 197

Are there reasons why we haven't seen PRPs as a
 dietary supplement before now?..... 198

How does one discuss PRPs in terms of structure-function claims?..... 198

Are PRPs FDA approved?..... 199

Are PRPs safe?..... 199

Are there any reports about PRPs helping people with cancer?..... 199

What about colds?..... 199

Are PRPs safe for infants?..... 200

Why are PRPs different from other PRP products
 or colostrum products?..... 200

What types of responses are possible with PRPs?..... 200

What are the reasons some patients do not respond?..... 200

Adverse side effects of taking PRPs?..... 201

How should one take enhanced PRP products for Human
 Herpesvirus-6 (HHV-6) and Epstein-Barr Virus (EBV)?..... 201

Summary of PRPs..... 202

APPENDIX A..... 203

Brief Review of the Immune System..... 203

Passive Immunity..... 204

Passive Local Protection..... 205

APPENDIX B 209

 Typical Specification of a First Milking Whole Colostrum Powder 209

 Material Safety and Data Sheet of a Colostrum Powder 212

 Typical Product Specifications of a Liquid PRPs Isolate 216

 Material Safety and Data Sheet of a PRPs Isolate 218

APPENDIX C 222

 Institute for Colostrum Research 222

 ICR Quality Scale 222

 Bovine Lactoferrin 230

 Growth Factors 232

 Igf-I and Cancer—Not! 235

 Glutathione: A Powerful Antioxidant Found In Colostrum 241

 Complex Lipids 247

 Lactose Intolerance, Dairy Products, and Colostrum 253

 Colostrum Plus Probiotics, Prebiotics, and Complex Lipids 257

 Pasteurization 271

 Freeze Drying vs Spray Drying 276

 Additives vs Actives 279

 Athletic Performance and Colostrum 280

 Colostrum vs Creatine 289

 A Comparison of IgG and IgG1 Activity in an Early Milk Concentrate from
 Non-Immunized Cows and a Milk from Hyperimmunized Animals 291

 Leptin 294

 FAQs from the Institute for Colostrum Research Website 300

APPENDIX D 328

 Can Colostrum Assist AIDS Patients? 328

 Glossary 331

 Index 336

 References 357

P R E F A C E

I was born and raised on a dairy farm in New Zealand. Like many young dairy families in New Zealand, raising cows and children simultaneously was a challenge in a climate that would often experience four seasons in one day. We were somewhat isolated on a dairy farm, or maybe it was a good thing to be protected from the big city life challenges. Once a year, as kids, we would be driven by our parents about an hour to the big city (New Plymouth, about 40,000 people) to dine on Kentucky Fried Chicken. Well, that was a treat for a youngster who for 364 days a year was reared on potatoes, vegetables and red meat.

Growing up on a farm taught us kids the value of a good day’s work. There was always something to do, whether we wanted to do it or not. Cows, pigs, sheep, horses, and chickens all had to be fed, lawns had to be mown, vegetables had to be grown, fences had to be mended, stock had to be moved, cows had to be milked, weeds had to be controlled, tracks and buildings had to be maintained, fertilizer had to be spread on the pasture, water lines and electric fences had to work, trees and riverbanks had to be maintained, swamps and pastures had to be drained, machinery had to operate, everything dirty had to be cleaned, firewood for the winter had to be cut and stored for drying, hay had to be collected and stored, rodents and pests had to be killed—I could go on and on, but you get the idea.

As a young boy on a dairy farm in New Zealand, one of my chores in springtime was to feed the young female calves my parents kept to one day become milkers, just like their mothers. Twice a day, before and after school, I would collect buckets of yellow milk that my dad milked from the new cows coming into the milk shed. My father would feed the boy calves with this yellow milk, and I would carry

five gallon buckets of this yellow milk down to the female calf shed. After the boy calves were fed, a truck would come and take them away; they were of little use on a dairy farm as they did not produce milk, and no milk equals no money for the farm. The female calves were always excited about their twice daily feeding. They loved this yellow milk. In fact, we would have to ration it to them because they would drink it until they exploded if we gave them too much.

As I grew older and the farm got bigger and as my parents purchased neighboring farms, they hired staff to take care of these daily farm tasks. Fortunately, spelling and doing math problems were easy for me, so I got good grades at school. I left the farm at age eighteen and went to college for the next eight years to study science and engineering. After finishing my PhD on a Friday, I started work on Monday to help pay for my student loan. I began work as a Research Engineer for New Zealand Dairy Research Institute in Palmerston North. There I worked on projects to figure out ways to fractionate, or split apart, dairy proteins, oils, and other stuff.

After visiting my older sister, her husband and their three daughters, Bailey, Sienna, and Mikayla, in Palm Springs, California, I saw a bigger world in America, so I moved 6,000 miles to the land of the free, home of the brave. In 1997, I started work for Dairy Farmers of America, the largest dairy cooperative in the US, as their Whey Protein Technical Manager. One of my areas of interest was to develop colostrum extraction technologies. Over the next three years the focus moved from added-value ingredients back to commodities, so they shelved a lot of these projects. I asked if I could continue my work on colostrum during my own time, and I was given the green light.

In 2003 I teamed up with three individuals from the California dairy industry and built a new dedicated colostrum processing facility in Phoenix, Arizona. Having access to their new state-of-the-art facility has provided me with the opportunity to continue my work with colostrum.

There are a handful of publications on colostrum that present its benefits to human and animal health, but they are incomplete in context. In this publication

I have tried to take the presentation of the quite remarkable benefits of colostrum and its constituents to a new level. Although clinical in nature and useful as a reference manual for those consumers and professionals seeking a greater understanding of colostrum, all will benefit in our constant struggle against the numerous challenges we face today in a world that is toxic and foreign to human body biochemistry.

I hope that this publication offers some enlightenment or knowledge for everyone who reads it so all can be aware of the wonderful healing and nutritional benefits that colostrum can give us. The true gem in the colostrum are the Proline-rich Polypeptides (PRPs). These peptides modulate, balance, regulate or initiate indirectly most of the biochemical processes in the mammalian body. They are probably the most significant natural substances in the human body relating to the immune system.

These are so important that God intended for us to have these peptides as soon as we enter this world.

They also happen to be found in abundance in colostrum—life's first food. Taking these peptides as we age, we redirect our bodies to function in homeostasis. Read on for more information about these healthful peptides.

■ **Andrew Keech PhD**

INTRODUCTION

Immunity has become a subject of interest to everyone at the dawn of the third millennium. Our confidence in Western medicine, and particularly in pharmacologic drugs, has been shaken by the appearance of drug-resistant strains of pathogenic (disease-causing) microorganisms and diseases, such as tuberculosis and staphylococcus, and entirely new and dangerous diseases that were unknown until recent years, such as AIDS, Ebola, SARS, and bird flu, all of which are resistant to all known antibiotics. Also, the drug industry is facing the dangers of new drug interactions and side effects of test-tube created aliphatic medicines, ultimately keeping trial lawyers employed due to fully unproven new medications released by the Food and Drug Administration (FDA) or other government officials.

Fortunately, a new interest in an old remedy has emerged. It is a remedy that is as old as mankind itself, nay, older, as old as mammals. There are several natural products that have shown promise in empowering the body to treat itself. In this treatise we will deal with one that is probably the most successful natural product we have been leased to have. It is called colostrum, and it is the first food that all mammals taste in this life, the first milk that emerges from the mother's breast following the birth of the newborn. It is a fascinating mixture of immune and growth factors and basic nutrients all designed to give the newborn the best chance of surviving in its cold, new world. The process of birth is indeed a physical process. It is not until the newborn receives the colostrum that the immune system is truly activated. Newborns that do not receive the gift of colostrum do not thrive and typically face more health challenges than newborns that are given colostrum.

But the ancients also discovered that colostrum was good for people of all ages,

not just newborns. It provided health maintenance long before the appearance of medicine as we know it and helped mankind weather the long years before the birth of civilization. Furthermore, up until the twentieth century it was our main source of immune protection against the many infectious diseases that regularly took their toll on humanity.

Over the last fifty years or so, scientists have begun to untangle the complicated web that is colostrum, teasing out the many different components that make it up. It has become clear that many of the substances in colostrum function as signal transducers that turn on or off different cell functions, particular those of the immune system. Signal transducers are one way the body regulates itself by "talking" to the trillions of cells that make up the body. These signaling molecules are usually small peptides,¹ polypeptides,² or proteins³ that have corresponding receptors on the outer membranes of their target cells. When the signaling molecules are released, they travel through the blood to their target cells where they bind to the receptors, setting off a chain of events that result in a certain action taking place, such as the production of a specific protein, an immunoglobulin, for example. This is one of the principal ways that the body is able to function as a unit even though composed of many individual cells. The growth factors in colostrum function as signal transducers as do many other components of colostrum.

One family of components in colostrum consists of very short peptides or polypeptides. This family of peptides is characterized by having a greater frequency of the amino acid proline in their makeup than is normally found in peptides and proteins, hence the name Proline-rich Polypeptides, or PRPs.

For years scientists had known that there was an unidentified substance in colostrum of very low molecular weight that could be filtered out and used to transfer immunity from one individual to another. It was called "transfer factor," among other names, but for many years the identity of this substance was unknown. Then scientists in Poland found a complex of peptides in colostrum that had the

¹ Short chains of amino acids

² Longer chains of amino acids with no tertiary structure

³ Very long chains of amino acids that have a tertiary, or three-dimensional, structure that is often very complex

unique ability to modulate the immune response by activating the immune system when needed to fight an infection or inhibiting the immune response when the infection had been contained to avoid damaging healthy tissue. They termed these polypeptides colostrinin after the colostrum in which they were discovered. Another team of scientists in the United States found a similar substance in a dialyzable extract from leukocytes⁴ that could also transfer immunity. Over the years it has become clear that all these were in fact PRPs.

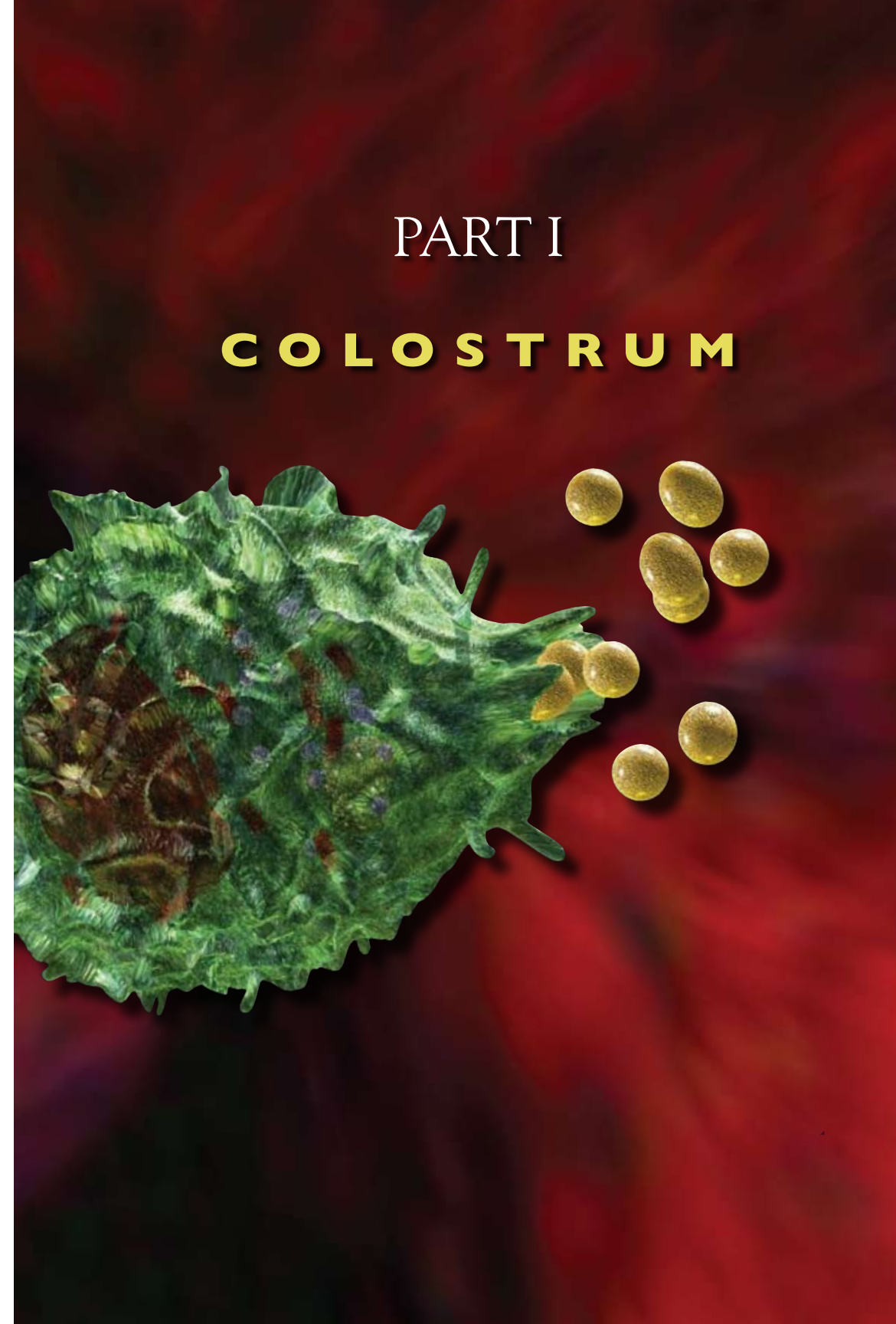
Taking colostrum as a nutritional supplement helps maintain your health, particularly your gut health, which is critical to your overall health. Whole colostrum includes PRPs as well as a number of other immune factors, such as immunoglobulins, lactoferrin, and others, so you will receive significant immune benefit from taking whole colostrum. However, when you experience an infectious illness, such as a cold or flu, or if you experience an autoimmune condition, which indicates an overactive immune system that is attacking your own cells, then you need something stronger. PRPs are now available in a concentrated spray form that delivers maximum amounts of the immunomodulatory peptides to help modulate your immune system.

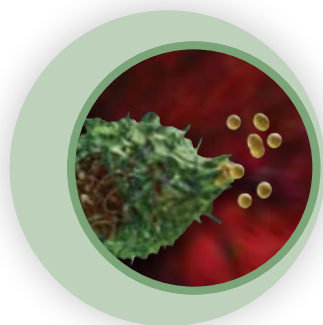
The purpose of this book is to introduce you to PRPs and how they can help you maintain your health. First we will start with an overview of colostrum, its history, and its components. Then we will examine PRPs in more depth, how they work, what they do, and what health conditions they may help. Our hope is to give you the information you need to use colostrum and PRPs wisely to maintain your health and the health of your family.

DISCLAIMER:

The statements contained herein have not been evaluated by the Food And Drug Administration. It is not intended to diagnose, treat, cure or prevent disease. The statements are for informational purposes only and is not meant to replace the services or recommendations of a physician or qualified health care practitioner. Those with health problems or pregnancy are specifically advised that they should consult their physician before taking colostrum or any nutritional supplement.

⁴ White blood cells, also known as polymorphonuclear leukocytes.





CHAPTER 1

WHAT'S IN COLOSTRUM?

Colostrum is the first pre-milk substance that is produced by the mammary gland of female mammals, including humans, following the birth of the newborn. It is the first food tasted in this life by all mammals. It is a special substance that is very unlike other foods, even milk. It is loaded with immune factors, growth factors, and protective proteins as well as all the nutrients the newborn needs to survive. The immune factors in colostrum provide the immunity necessary to ward off potentially fatal infections until the newborn's own immune system can get up to speed, and the growth factors help complete the development of the gut, which is not fully developed at the time of birth.

Mankind has known for thousands of years the benefits of colostrum to both the newborn as well as people of all ages. We will discuss the history of colostrum use in the next chapter, but it is important to understand that colostrum holds many benefits for all people. Strangely enough, however, it is not human colostrum that holds the greatest benefit for humans beyond the newborn stage but bovine (cow) colostrum. This is due to a difference in the placentas of cows and humans.

The human placenta allows the passage of immunoglobulin G (IgG), which is responsible for establishing systemic immunity, from mother to fetus. This means that a human baby is born with an immune system that is already primed and ready to begin its work defending the newborn against infection. The placenta of the cow, however, does not allow the passage of IgG from mother to fetus. Therefore when the calf is born it is completely unprotected from infection

and needs the IgG in the mother's colostrum to survive. Thus bovine colostrum contains predominantly IgG (over 85% of total immunoglobulin) while human colostrum contains predominantly immunoglobulin A (IgA), which is designed for local immunity and is intended to help the newborn's immune system handle infections locally in the gut rather than establish systemic immunity. IgG, because it can pass immunity to a specific pathogen (disease-causing microorganism) from one individual to another, is therefore of much more benefit to humans past the stage of infancy. It is also produced in great quantities by the mother cow far exceeding the needs of the calf.

For the consumer seeking a nutritional supplement that will help maintain his or her health, it is important to remember that colostrum is a multifunctional complex of bioactive ingredients produced by mammals for mammals (which means you). If you walk into a natural foods store and examine the products on the shelves, nearly all are derived from plants, and generally speaking, most have only one function. It is also important to remember that most plant-derived supplements or herbs have little if any scientific research to back up their health claims, while many thousands of scientific studies from all around the world and virtually every leading research institution have been done on the health benefits of colostrum and its many ingredients.

Colostrum is so complex that we are only beginning to understand how it all works together. New components are still being identified, and the mechanisms of action of known components are still being worked out. The one thing that can be said with certainty is that there is no simple replacement for colostrum. It does a multitude of tasks, and the individual components work together in a synergy that no combination of plant-derived components could ever simulate.

What Are the Legal vs Actual Definitions of Colostrum?

It is well known that colostrum is the first pre-milk substance that is produced by the mammary gland of female mammals, following the birth of the newborn. However, the legal definition differs from the actual definition.

The legal definition: In the California Food and Agricultural Code, section 35602, “Milk shall be obtained by the complete milking of healthy cows or goats which are properly fed and kept. Milk shall not be obtained or used for human consumption within 15 days prior to or 5 days after parturition.”

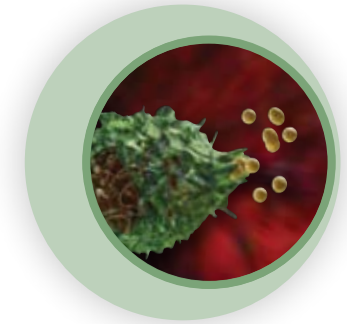
Defining colostrum as milk that is collected up to five days is more of a legal definition rather than an actual definition.

Colostrum is more commonly defined as “milk that is in the mammary glands at the time of birth.” Milk that is manufactured after the birth is characterized as “transitional milk”; actually, the third and fourth milking is transitional milk. By the time of the fifth milking, analytical methods indicate that the milk has essentially the same chemistry as that of mature milk.

One of the main reasons why this five-day period was implemented initially is because most cows, especially older cows, received antibiotic treatments to protect their udders from infection during their dry period, which is typically 45–60 days. After that period the cow could birth another calf. These older antibiotic treatments have a 72-hour withholding period, so, previously one should not have consumed the colostrum within 72 hours of birth.

With the advent of modern veterinary dry-cow therapies (beta-lactam drugs or preservatives), these typically have a 28-day withholding period. Thus the residual antibiotics have been removed well before the calf is born (45–60-day non-milking or dry period). So colostrum is safe to consume for animals and humans.

A consumer should seek colostrum powder in the market that is labeled “First Milking.” This can also include the second milking because the second is actually the remaining first milk that was not removed on first milking. See Figure 1, page 64, HPLC graphs of colostrum showing IgG peak at 8 minutes for the first eight milkings after giving birth. A consumer should also look for colostrum peptide (PRPs) content not less than 3% by weight.



CHAPTER 2

A BRIEF HISTORY OF COLOSTRUM

The history of colostrum use, chiefly bovine colostrum, is as old as history itself. Cow and man have enjoyed a symbiotic relationship since before the last ice age. The cow served both as a source of food and a beast of burden. The cow was at the center of the primitive agricultural economies that were the foundation of civilization. The ancient *auroch*, an extinct species of cattle from which modern cattle are descended, play a prominent role in the 17,000 year old cave paintings found in Lascaux, France—the oldest human art known. Selective breeding of cattle was practiced in Mesopotamia as early as 5,000 BCE.

In Europe, cows and men have lived intimately for centuries. Cows often shared the farmer's home in cold times. In England and Scandinavia, colostrum is a traditional tonic and folk remedy given to the entire family in the spring to keep them healthy for the entire year. The first milking of a cow following a calving is traditionally made into a pudding called *beestings* to celebrate the birth and promote good health.¹

Ayurvedic medicine has used colostrum for thousands of years in India where it continues to be widely used today. Cows are considered to be gods in India.² Hieroglyphic texts show that colostrum was used by the Ancient Egyptians as well. On one stele in a temple dedicated to Hathor, the cow goddess and symbol of rebirth, the goddess is depicted suckling the Pharaoh, offering her colostrum as the elixir of metamorphosis to confer immortality upon the king.³

Masai tribesmen in Kenya drink bovine colostrum by the liter because they know how good it is for them. They are well-known for their toughness under extreme conditions and their healthy constitutions. Cows are considered their most important form of wealth, and they even sing songs of praise to colostrum in recognition of the health it gives them.⁴

However, taboos against the use of colostrum during breastfeeding are found worldwide. Delaying breastfeeding until the fifth day and using a combination of honey and clarified butter (ghee) to evacuate the meconium was practiced in India by the second century BC. In the Bible, a reference is made to giving curds and honey to the son born of a virgin "until he knows how to reject the evil and choose the good."⁵ This taboo, derived from ancient Greek and Roman sources, carried through to seventeenth century England and France.⁶ The taboo against colostrum persists in many cultures even today.⁷

When Antony van Leeuwenhoek—Dutch inventor of the microscope and discoverer of bacteria, red blood cells and protozoa—first peered through his new invention, he was looking at milk. This was in 1674.⁸ Both Paul Ehrlich, the "Father of Immunology," and Elie Metchnikoff, another great nineteenth century immunologist, studied the immunologic properties of colostrum.^{9,10,11,12} When Albert Sabin, inventor of the oral polio vaccine, made his first polio vaccine, he used antibodies from bovine colostrum.^{13,14}

Prior to 1950, colostrum was intensively studied and used for its immune boosting powers and as a treatment for rheumatoid arthritis, for which it showed great promise. Unfortunately, with the advent of sulfa drugs, cheap antibiotics and other synthetic drugs, interest waned in natural remedies. The benefits of colostrum were largely lost for over forty years.

Prior to 1980 colostrum was harvested in North America from buffalo and goats. Post-1980s, colostrum was then sourced from bovine or cows owing to the abundant availability of this raw material.