A pandemic or worldwide epidemic is in progress. A newly discovered disease first recognized just over three months ago has affected some 8240 people worldwide, causing over 745 deaths, including the physician credited with discovering the disease – Dr Carlo Urbani an expert on communicable diseases with the World Health Organization (WHO). This disease is now referred to as Severe Acute Respiratory Syndrome (SARS). Since the first case of SARS which was discovered in China the disease has now spread throughout Asia to as far as Canada, Brazil, and Europe. According to the WHO while some drugs have been tried, at this time, no drug can be recommended to treat this disease. Symptoms of the disease include high fever, dry cough, and respiratory distress which is indicative of pneumonia. Other symptoms which can be associated with SARS are headache, stiffness, rash, diarrhoea, and a state of confusion. Though the mortality rate was first estimated to be 3-5% it now appears that a figure of 10% is more accurate (Table 1).

There is a very good likelihood that this is an airborne disease spread by close contact with infected individuals. It is also very likely that the disease causing agent for SARS can survive on inanimate objects, such as tabletops, counters, elevator buttons, telephone and computer keys. Though reported to be less infectious than influenza officials in Hong Kong fearful of the spread of the disease have recently placed individuals thought to have been exposed to the disease in forced quarantine. This includes some 15,000 individuals living in one apartment complex. In Hong Kong and Singapore schools have been closed until further notice. In order to halt the spread of the disease governments in a number of countries have invoked special powers to ensure individuals suffering from the disease remain in quarantine – with the threat of fines and or imprisonment to offenders.
The seriousness of this disease and its impact on the world is best exemplified by the stance of the two most highly respected institutions involved with public health: Center for Disease Control (CDC) and the World Health Organization (WHO). The CDC has issued travel advisories to Hong Kong, Mainland China, Hanoi, Singapore and has recommended that any non-essential travel to these areas be postponed until further notice. The WHO has even taken a stronger stand on this issue and is advising that travel to Hong Kong and parts of China be restricted. It should be noted that this is the first time in the history of the WHO that they have issued such travel advice because of an outbreak of an infectious disease.

The causative agents responsible for this disease had originally been attributed to two viruses; coronavirus and paramyxovirus. Though the CDC and WHO were somewhat in disagreement on exactly which of the two viruses is responsible both agreed that a coronavirus is at least in part involved. Further, WHO reports that both pathogens should be given equal status as they may together function in a complementary manner to cause the severe respiratory condition. The significance of coronavirus is that it invades the immune cells, which are so important in fighting infection. The paramyxovirus is part of the family which causes mumps, measles, respiratory infections in humans, and Newcastle disease in poultry & horses. The coronavirus is part of the family which causes the common cold. In fact it has been reported that between 20-30% of “colds” are due to coronavirus infection. Of outmost significance was the commonly held viewpoint that SARS is caused by a mutated form of either both or one of these viruses. More recently it has been determined that the coronavirus is the single most causative agent responsible for the infection causing SARS.
The WHO has revealed that the virus or viruses causing SARS most likely have originated in farm animals and through mutation has crossed the species barrier. According to the WHO many emerging diseases have arisen this way. It is of interest that the influenza “Spanish Flu” pandemic following World War I, which killed some 40 million people worldwide, arose this way. This was a particularly deadly flu which arose from pigs. It is of further interest that the coronavirus associated with SARS is thought also to have arisen from pigs. Further, the south China region where SARS is thought to have originated has historically been associated with animal viruses crossing the species barrier and infecting humans. Finally it has been reported that, “Any severe respiratory syndrome outbreak in East Asia provokes intense interest among infectious disease specialists who believe that another 1918- style killer flu pandemic is inevitable, and will most likely emerge in that region.”

The incubation period for SARS appears to be between 2 and 7 days, with 3-5 days being the more common. The mortality rate for SARS had been initially estimated to be 3-5% although WHO has reported that the “true” mortality rate may be even higher. Presently overall mortality worldwide is thought to be approximately 10% with higher figures based on geographical location and age of infected individuals. A case in point is Hong Kong where mortality figures are
considerably higher for SARS infected individuals – 55% mortality for infected individuals over the age of 60 years and up 20% mortality for younger sufferers of SARS.

While most individuals will recover many develop severe pneumonia which requires hospitalization. According to WHO fatalities are usually associated with an underlying condition such as diabetes, heart disease, or a weakened immune system. In some 90% of the cases, individuals will recover around a week after being infected. It appears that the elderly and those with underlying conditions are affected most severely.

CORONAVIRUS

Although there are many strains of coronavirus only two serotypes were known to infect humans – that is until the outbreak of SARS. Coronaviruses first discovered in the 1960’s are named because of their corona or crown like outer coat structure. Members of this genus are single stranded RNA viruses of which the biology is very complex and poorly understood. Coronaviruses are known, potentially lethal, pathogens in veterinary medicine and primarily associated with enteric infections causing gastroenteritis and diarrhea (scours). They are also associated with disease states in humans and this includes the common cold (upper respiratory tract infection), lower respiratory tract infection, diarrhea, necrotizing enterocolitis, and possibly multiple sclerosis (MS).

Enteric infections causing diarrhea or gastroenteritis (scours) are the leading cause of infant morbidity and mortality worldwide. This includes not only human infants but also young animals. The leading cause scours is rotavirus (50%) – followed by coronavirus (15%) and then E. coli (9%).

HUMAN CORONAVIRUS

In humans coronavirus infection is the seconding leading cause of the "common cold". The virus is contracted through either aerosolized droplets or mechanically introduced to the eyes and mouth via the hands. In regard to the “common cold” the virus infects the cells of the upper respiratory tract and causes the typical symptoms associated with this disease – nasal obstruction, irritation, sore throat, coughing, and sneezing. In this respect the virus replicates locally in the epithelium (tissue) of the upper respiratory tract causing local cellular damage. This initiates an immune response which is spearheaded by the release of cytokines causing inflammation.

The incidence of colds associated with coronavirus usually peak in winter with infection self limiting and usually resolving in 5 to 7 days. Though there is an associated increase in circulating specific antibody titre immunity is short lived and re-infection is common. The main cause of colds is rhinovirus infection and
this differs from the coronavirus type in that it is usually contracted in the fall and post recovery is associated with long lasting immunity.

**Necrotizing entercolitis (NEC)** is major cause of morbidity (disease) and mortality (death) in human neonatal (premature) babies. This is an acute gastroenteritis which is associated with both the small and large intestines and is the leading cause of gastrointestinal emergency in premature babies. Although primarily effecting premature babies approximately 10% of affected babies are born at full term. Mortality rates vary based on gestation age and birth weight but can vary from 9 to 28%. Coronavirus infection has been proposed as a causative agent of this disease. The coronavirus strain which causes NEC and diarrhea is different from the one that causes the cold and respiratory tract infection. It is of interest that this particular strain has been identified as evolving from a disease originally affecting cows - first identified only some 8 years ago.

**BOVINE CORONAVIRUS**

Bovine coronavirus infection is a major cause of neonatal calf diarrhea accounting for approximately 15% of scours cases. Besides causing gastroenteritis it also is associated with disease of the respiratory tract. It is of interest that the bovine coronavirus is very similar to the coronavirus which is the causative agent responsible for SARS.

Bovine coronavirus (BCV) is recognized as the primary agent causing **Winter Dysentry** (WD) in adult cows and coronavirus diarrhea in young (3-21 days old) calves. The incidence of Winter Dysentry (morbidity) is very high with an infection rate ranging between 50-100%. However the death or mortality rate is relatively low ranging between 1-2%. BCV survives well in humid environments – even at low temperatures but is effected by ultra violet light. The highest incidence of Winter Dysentry is usually observed when cows are housed or kept in close confinement. Clinically, Winter Dysentry is characterized by watery – sometimes hemorrhagic diarrhea, decreased milk production, loss of appetite, weight loss, and nasal discharge. Winter dysentery causes varying degrees of degeneration and necrosis to both the small and large intestine. Relatively long lasting immunity (1-5 years) is associated with recovery.

Coronavirus diarrhea in young calves is associated with watery and hemorrhagic diarrhea which can last from 2 to 6 days. In severe cases death may result. Early ingestion of colostrum has been shown to have a beneficial protective effect against infection. In addition colostrum has been shown to limit or reduce duration of infection.

As was mentioned bovine coronavirus can also cause infections of the respiratory tract. Clinically these are usually seen in calfs 2-16 weeks old and are typically either “sub-clinical or quite mild. The virus infects the epithelium of the respiratory tract and besides causing sneezing and coughing may predispose the
animal to opportunistic bacterial infections. As with enteric infection colostrum has been shown to help prevent infection and reduce the duration and symptoms of the disease.

**SWINE CORONAVIRUS**

The causative agent (coronavirus) responsible for SARS originated in the pig. Through mutation it skipped the species barrier and now effects human. The interesting thing about pigs is that they are typically used as a model for investigations involving human digestion. This is because the pig digestive system is most like the human.

Pigs like humans suffer a multitude of diseases and thus they have a very high rate morbidity and mortality – this is very evident in young piglets. Briefly, left untreated mortality rates in young piglets can reach 50%. Infection with pathogenic bacteria and virus is responsible for a great percentage of these deaths. One such virus – transmissible coronavirus is a devastating disease that affects piglets, especially in highly dense populations. Mortality rates associated with this infection can be as high as 100% in piglets less than 14 days old. Because of this it has become routine in commercial swine farming operations to incorporate the use of antibiotics in the prevention of disease and thus promote growth. As a matter of course this has led to an increase in survival rates for the young piglets. However even with the inclusion of antibiotics mortality is still high with 10% to 15% of the young piglets dying from each litter. In fact even the top producers are reporting mortality rates of 8.3% in their young piglets. These high mortality rates are most assuredly due to viral infection as antibiotics are in-effective against virus.

Bovine colostrum and bovine colostral immunoglobulins IgG, IgA, and IgM have been shown to protect neonatal pigs against the coronavirus of transmissible gastroenteritis. Efficacy of bovine colostrum and colostral Immunoglobulins in the prevention of gastroenteritis, both viral and bacterial, is well established. This has been evidenced in clinical trials involving humans pigs, cows, horses, and other animals. Further colostrum and colostral Immunoglobulins, in the form of antibodies, have been shown to prevent rotovirus infection.

A recent clinical trial was conducted on young piglets to evaluate the influence a non-immunised colostrum preparation has on piglet survival when given in conjunction with conventional antibiotic treatment (Table 2). The results were significant in that the use of antibiotics alone (Control Group) resulted in 16.4% deaths as compared the use of colostrum in conjunction with antibiotics (Trial Group) experiencing no deaths – all the animals survived. Further the colostrum group also experienced a significant higher growth rate which indicates that morbidity was also reduced (Table 3).

**Table 2. Piglet Clinical Trial – Trial Design**
BioActive DiaBan Colostrum Piglet Trial

Total 10 sows with 10 Litters Over First 10 Days Following Birth

- **Control Group**
  - 5 Sows – 5 Litters
  - N=54
  - Sow – Amoxicilin
  - Piglets – Excenel on days 1,7 and weaning

- **Trial Group**
  - 5 Sows – 5 Litters
  - N=52
  - Sow Amoxicilin
  - Piglets – Excenel on days 1,7 and weaning
  - DiaBan – 2 x 5g/day

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**Table 3. Piglet Clinical Trial Results**

BioActive DiaBan Colostrum Piglet Trial

- **Control Group**
  - Nine (9) Piglets Died
  - Mortality 16.7%

- **DiaBan Trial Group**
  - All Piglets Survived
  - Mortality - None
  - Average Weight Gain 11.7%
As a follow up to the piglet trial the specific IgG antibody titre to bovine coronavirus was determined in the colostrum used to formulate the BioActive DiaBan product. The results indicate that specific IgG antibody titre is greater then 1:10,000 based on limited dilution (Table 4). This is a significant titre and indicates that this colostrum is very potent in potentially neutralizing the coronavirus.

**Table 4. Alpha Lipid Bovine Colostrum IgG Specific Antibody Relative Titre to Bovine Coronavirus**

<table>
<thead>
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<th>Dilution - Relative Titre</th>
<th>Absorbance</th>
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<tr>
<td>10</td>
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<tr>
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**SUMMARY**

The wonderful thing about the immune response is that the immunoglobulins and immune factors function in both a specific and non-specific manner in regard to a potential disease causing situation. Firstly, antibodies are specific in their function as they hunt down, fight and destroy specific pathogens. Antibodies were raised to these specific pathogens upon previous exposure. The other immune factors function in a non-specific function to fight disease and disease causing agents such as bacteria, virus, and fungi. There is no resistance to the immune response and bacteria, virus, fungi can not develop resistance. Immunity is the best form of protection.

Specifically in regard to SARS bovine colostrum has been shown to prevent both bovine and swine coronavirus infection. Bovine coronavirus is most like the coronavirus which cases SARS. The coronavirus which causes SARS originated in the pig. Alpha Lipid colostrum and DiaBan colostrum have been shown to decrease mortality and morbidity in piglets. A significant causative infectious agent in both pigs, especially young piglets and cows is the coronavirus of transmissible gastroenteritis. Colostrum has been shown to prevent this infection. The coronavirus which causes SARS originated in the pig. The antibody potency of Alpha Lipid Colostrum has been established in regard to specific IgG antibody to bovine coronavirus and the relative titre is significant. This together with the fact that the use of bovine colostrum in the treatment and prevention of
numerous disease states caused by bacteria, virus and fungi suggests that colostrum is an ideal candidate as a preventative against SARS infection.

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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 it 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.

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