Humanimal Trust
One Medicine Day Virtual Seminar
6th May 2022

Full Report:
'One Medicine in Action
Awareness, Collaboration and Change'

Humanimal Trust

ONE Medicine for humans and animals

Registered charity no.s 1156927 & SC048960

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Humanimal Trust One Medicine Day Virtual Seminar
'One Medicine in Action - Awareness, Collaboration and Change': Full Report

Summary

On 6th May 2022, Humanimal Trust celebrated its 8th anniversary, having been founded in 2014 by Professor Noel Fitzpatrick. In May 2021, the Trust's inaugural Symposium: 'Stronger Together' created a roadmap for Humanimal Trust's vision of One Medicine, with key signposts identified as awareness, collaboration and change. To take One Medicine into the mainstream, what would joined-up approaches look like in action? How do we raise greater awareness of the benefits of such approaches? How can we provide more opportunities? How do we communicate the benefits of change? These signposts formed the theme of our 2022 virtual seminar where speakers shared their thoughts and experiences on collaborations between the two medical disciplines in action and the associated challenges. The seminar attracted close to 200 registrations and we were joined on the day by a diverse audience from a wide range of professional backgrounds, sectors and career stages.

The seminar commenced with an overview of One Medicine and the work of Humanimal Trust given in the Welcome Address by Humanimal Trust's Chair of Trustees, Professor Roberto La Ragione. His talk encompassed the origins of One Medicine, the Trust and the many shared interests that unite human and veterinary medicine. He concluded with an introduction to the five main workstreams of the Trust which are delivered under the acronym or mantra: "ICARE" – Influence, Collaboration, Awareness, Research, Education. To view the talk please click here

- Humanimal Trust Chair of Trustees, Professor Roberto La Ragione gave an overview of One Medicine and the work of the Trust. He introduced the Trust's five core workstreams, delivered under the acronym "ICARE": influence, collaboration, awareness, research and education.

- Founder and CEO of One Health Lessons, Dr Deborah Thomson, shared her experience of how to communicate effectively within and outside the medical communities, emphasising teamwork, empathy, thinking outside the box and multi-disciplinary collaboration – all of which One Medicine espouses.

- Paediatric surgeon, Miss Anna Radford articulated the challenges faced in her journey to become a consultant surgeon and what prevents human medical professionals from being more open towards One Medicine and One Health approaches. Professionals become increasingly specialized and siloed as they become more senior. However, she also highlighted similarities that paediatricians share with veterinarians when seeing urological patients, such as obtaining an accurate medical and family history and the challenge of antibiotic resistance.

- Dr Simon Doherty of the Institute of Global Food Security, Queen's University Belfast, brought together One Medicine, One Health and One Welfare in a unified approach he called One Agriculture and spoke of the multidisciplinary interactions and collaborations occurring in the agri-food sector.

- Dr Doug Brown, Chief Executive of the British Society for Immunology presented a case study of the Veterinary Vaccines Report, showing the potential for two-way learning between human and animal medicine and research in immunology.

- A concluding Q&A session discussed how to reconcile the use of animals in vaccine research and how advances in areas such as Artificial Intelligence are contributing to the reduction, refinement and replacement of animal use in vaccine development and other areas such as cancer research. The panel also discussed the importance of a single standardised definition for One Medicine and Humanimal Trust's potential role in spearheading this.

Introduction

Humanimal Trust's founder, Professor Noel Fitzpatrick, as a veterinarian, personally experienced the silos that exist between human and veterinary medicine. Determined to change this, he created a platform to bring the two disciplines together and hence the Trust was formed. In creating the new, Professor Fitzpatrick looked back to those who had previously advocated the connections and synergies between human and veterinary medicine, such as Rudolf Virchow, Sir William Osler, Dr Calvin Schwabe and Lord Lawson Soulsby, each of whom contributed significantly to bridging the gap between the disciplines. It was also in history that Professor Fitzpatrick came upon a term used to describe human and veterinary medicine working with one another: One Medicine. The third edition of Dr Calvin Schwabe's seminal publication in 1984 of 'Veterinary Medicine and Human Health' which spoke of One Medicine, actually laid the foundation for what we now know as One Health but in considering this text, Fitzpatrick identified a need to move away from a public health agenda to a common health agenda which provided equitable and sustainable benefits to both humans and animals. From this, ripple effects would be created, such as the obsolescence of animal testing by considering the contribution that animals could make to research by the study of their lives and their responses to naturally occurring, spontaneous diseases rather than the use of experimental animal models in research. Having taken up the baton of this contemporary vision of One Medicine, it became clear to those involved in the early days of Humanimal Trust that a fourth R was missing from the 3Rs principle – the principle of reciprocity, and that it was the application of this principle that could deliver on this premise, and from which the Trust's work has developed.

Professor Roberto La Ragione, Chair of Trustees, Humanimal Trust

Welcome Address: One Medicine and the work of Humanimal Trust

Professor Roberto La Ragione provided an overview of the Trust and its work in the last eight years. Starting with a history of One Medicine and its most famous advocates

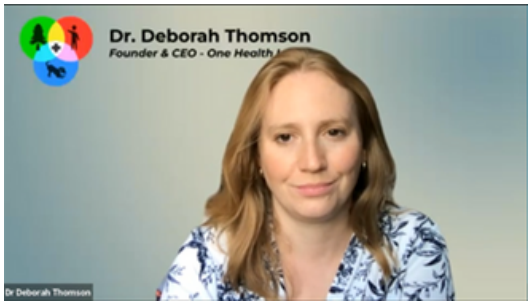
Some of the many factors which the two medical disciplines share were highlighted such as their shared clinical language, high levels of patient care, common values and history in medical areas such as epidemiology. In addition, just some of the many benefits of unified approaches to human and veterinary medicine were outlined e.g., medical advances being made more quickly via the application of mutual learning, closer collaboration, the obsolescence of experimental animal testing and the creation of a fairer society by providing such opportunities. Professor La Ragione gave examples of One Medicine studies from the scientific literature in areas such as oncology and arthritis which described the similarities between species and the ways human and animal patients are managed and treated.

He outlined the origins, aims and objectives of Humanimal Trust and the five main pillars of research that it seeks to fund: infection control and antimicrobial resistance, cancer, bone and joint disease, brain and spinal disease and regenerative medicine. He provided examples of research the Trust has funded.

- Understanding how osteosarcoma spreads, led by Prof. Matthew Allen, University of Cambridge
- Contributing funding to two research projects undertaken by the charity, Action Medical Research, both of which could have applications to veterinary medicine
- Liquid biopsies for canine patients – research undertaken by Professor Joanna Morris and Dr Tomoko Iwata at the University of Glasgow, a great example of reciprocity whereby human and animal bladder cancer patients may benefit from this research
- Alternatives to antibiotics – Dr Lucy Grist, the first recipient of the Trust's PhD studentship whose research at the University of Surrey examined the use of bacteriophages and their potential to treat highly pathogenic Escherichia coli.

Concluding, Professor La Ragione outlined the Trust's charitable activities and vision of a One Medicine community where both human and animals receive demonstrable benefit and where such approaches are understood and embraced; where unified approaches by human and veterinary medicine are the norm and are enabled by robust public policy and funding, with the scientific and legal needs for experimental animal testing having become obsolete. To view the talk please click here

Dr Deborah Thomson, Founder and CEO – One Health Lessons
Communication within and outside the Medical World



Deborah guided delegates through the art of science communication via several personal stories, emphasising the need for collaborative conversations between individuals in all healthcare settings.

Jack

Jack was 12 years old and obsessed with cats and football. He developed clinical signs of stomach ache and headache, starting the first of many visits to a number of different doctors to obtain a diagnosis. Over the next two years his condition deteriorated to the point where he was in a wheelchair. Eventually, Jack came into contact with a One Medicine team comprising a physician and a veterinarian who identified that before his first clinical sign, Jack had been scratched by a stray kitten with flea infestation, meaning Jack had been exposed to Bartonella bacterial infection, Cat Scratch Fever, and the physician was able to prescribe the correct antibiotic treatment. A One Medicine approach saved Jack's life.

Paradise

In 2018, following wildfires in Paradise, California, the Californian Veterinary Reserve Corps, of which Deborah is a member, handled 2,700 animals and brought together families who had lost animal companions with those that had rescued them from the flames. This highlights the culture change whereby companion animals are increasingly viewed as part of the family unit. This changing role of animals in the world is prioritizing the need for healthcare professionals to have holistic conversations, such as in preventative medicine.

Golden Retrievers

Deborah spoke about communicating science to policy makers as a veterinary clinician on Capitol Hill, Washington DC. Her advice for delegates when speaking to policy makers was to do your homework about who you are speaking with. For example, identifying an interest in indigenous people and land, together with breast cancer, led to a conversation with a Health Aide to one of the Senators.

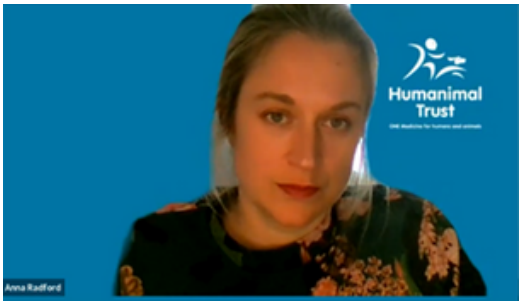
Chance conversations

She also spoke of a veterinary oncologist who attended an oncology conference and had got talking to their human medical counterparts over lunch. The human medics were intrigued by the comparisons between breast cancer in Golden Retrievers and the disease in humans. This chance meeting led to the two disciplines carrying on their conversation, learning from one another and working together, resulting in joint publications which have helped to advance diagnosis and treatment for breast cancer for the benefit of both human and animal patients – truly One Medicine in action.

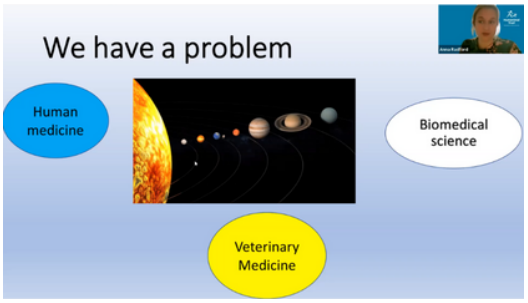
Deborah described opportunities One Health Lessons are providing to unify medical professionals via online One Medicine events. Their first event brought together a paediatrician (Miss Anna Radford) and a small animal clinician (Dr Leslie Brooks) with participants with a diverse range of perspectives. The event focused on a clinical assessment of Poppy, but participants were not told if Poppy was human or animal and if her care taker was an owner or parent. Human and veterinary medics looked jointly at electrocardiographs and ultrasound images, speaking clinician to clinician in the same language. At their second event, medical professionals jointly considered neuropathy, histology, false negatives/false positives and the types of test that they trust, once again speaking their shared clinical language, building relationships and sharing knowledge.
Deborah encouraged delegates to find transdisciplinary conversations and to join in and if they do not exist, then to create them. They were also asked to consider how they communicate science and medicine to the public and to acquire the specialist skills in communicating to policy makers whilst making sure they continually practice the art of science communication. To view the talk please click here

Miss Anna Radford, Consultant, Paediatric Surgery, Department of Paediatric Surgery, Hull Royal Infirmary, Hull, UK; Leeds Children's Hospital NHS Trust, Leeds, UK

Never work with children or animals



Anna's said that she was a human medical professional, converted to One Medicine, hence the irony of her talk's title. Presenting her perspectives on One Medicine through the lens of her own experience, she described her journey to medical consultant and physician scientist. Initially, Anna expressed a pessimistic view that the two medical disciplines and the allied biomedical sciences were still planets apart, although the situation is improving.



She had recently asked 50 people ranging from young people wanting to enter human or veterinary medicine, to healthcare professionals and consultants in universities on whether they had ever heard of either One Medicine or One Health. Only one person had heard of either concept.

Figure 2: We have a problem – slide from Anna's presentation

Poppy – a human or animal patient?

Anna had been one of the medical presenters at the event referred to in Dr Deborah Thomson's talk and presented a poll to delegates, based on what was known about Poppy. 71% of delegates who responded said that Poppy could have been either a human or animal patient, illustrating Anna's point that from her paediatrics perspective, medical professionals from both disciplines experience the same problems.

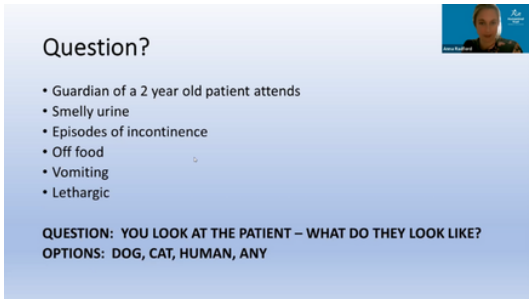
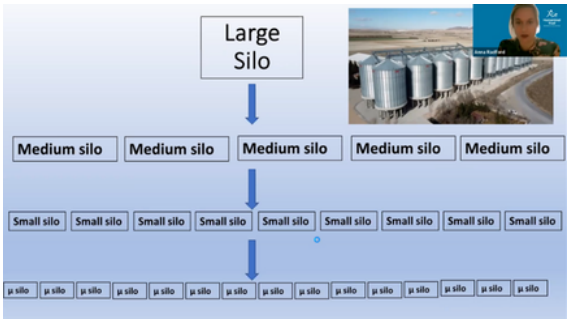


Figure 3: Question posed to delegates on the identity of Poppy

Both will have patients who can't participate in question taking, highlighting just some of the multiple challenges faced by human and veterinary medical professionals and the biomedical world – so why are they not talking to each other?



Silos

Talking about her own career path, wanting to make a positive impact by entering a caring profession, with each step of her progression through human medicine she became increasingly siloed, eventually surrounded by a bubble of other consultant paediatric surgeons, attending conferences in her specialist area, where the same problems were discussed year after year, never reaching solutions.

The hamster wheel

Anna reflected on the pandemic having seen the start of disciplinary borders being crossed, not just in relation to medicine. But as unified approaches start to occur, we must give the next generation of human and veterinary medical professionals the right opportunities and this needs to start early, particular in secondary education, where student CV's, personal statements and GCSE/A Level choices are geared towards their chosen career paths but can be scuppered by socio-economic and geographical factors. She highlighted the example of Lincolnshire (UK), a largely agricultural area where only 15% of secondary schools offer Triple Science GCSE. For young people wishing to enter human or veterinary medical schools, if they do not have Triple Science GCSE, they will be discriminated against.

Anna then presented a medical student timeline from entering medical school where they study for the next five to six years, with shared lectures with other disciplines only occurring in the pre-clinical years before they go their separate ways. Even then shared lectures are rare and becoming rarer as medical schools shift towards problem-based medicine. As medical students move into ever smaller siloed professional units, they lose their innate ability to see the bigger picture. Anna noted that medical students may receive only one lecture on public health and that only 27 medical schools in the UK offer paediatric surgery and even fewer offer lectures in One Medicine or One Health.

Physician scientists

Anna shared her experiences with delegates who wish to become academic physicians or veterinarians. For human medicine, those wishing to take this path must do so in the same timeframe as their medical training – this presents huge difficulties, e.g., securing funding, finding a suitable research post. Those wishing to pursue research in smaller, more specialized areas typically have to forge their own pathway, but this could be an area where One Medicine can offer a way forward. Anna shared a graph showing opinions of human medicine trainees and the results made for uncomfortable viewing. Over a third were unhappy at work or had been bullied or harassed at work and almost half had reported burnout. These challenges are only likely to intensify as the UK deals with a backlog in healthcare caused by the pandemic, so there is a risk that there will be even fewer physician scientists as funding is shifted to higher priority areas determined by policy makers. Whilst One Medicine and One Health increasingly are moving up the agenda, their presence is still small compared to medical challenges such as obesity, diabetes and cardiovascular disease, but Anna emphasised that these are healthcare challenges shared by both animals and humans.

Perceptions

Anna concluded with generational perceptions from peers to human medics interested in pursuing One Medicine and One Health. She shared with delegates some of the myopic comments received from her own peers and asserted that such attitudes need to change and that every university needs to start talking about One Medicine. Anna sees the similarities to veterinary medicine in her own areas of expertise, such as urinary tract infections (UTIs) but the demands of her job are such that she has limited time to stop and think about how to work better outside her own immediate bubble.

UTIs are a complex interaction between host and bacteria, with UTIs defined in terms of symptoms, urine analysis and microbiology. From a clinical perspective, one major issue is renal scarring, which has a significant impact on children in later life. She also spoke of the huge impact urinary stasis has on both humans and animals e.g., anatomical abnormalities, obstruction, VUR (vesicoureteral reflux), dysfunctional voiding, neuropathic bladder (incapable of emptying). For example, in children in the UK with Spina bifida, constipation is the most common cause of stasis. Providing examples of commonalities between human and veterinary patients, Anna spoke of ectopic ureters in canine and human patients having almost the same pathology and spina bifida occurring in certain dog breeds and cattle (if exposed to certain viruses). She highlighted some of the long time sequelae of UTIs such as loss of kidney function, losing nephrons and renal scarring leading to the development of hypertension in children.

Research – (Toll-like Receptor 5) TLR-5 and (recurrent urinary tract infection) rUTI

Finally, Anna spoke about her research on TLR-5 and genetic alterations to this receptor. She repeated a message given by a speaker from the Trust's 2021 symposium, that in terms of research – we have a rodent problem. Most medical research is performed on small rodent models first, such models e.g., Knockout (KO) models, are cheap and easy to get approval for. However, they are not fantastic predictors of disease e.g., UTIs, or drug effectiveness as such models do not really relate to real life. Previously, TLR-4 had been thought to have an important role in causing UTIs, however, it is now thought that TLR-5 is more important due to its role in reacting to the flagella in uropathic Escherichia coli. E. coli causing about 85% of UTIs in humans. The cohorts needed to test for the presence of resistant E. coli makes such a project a very niche area, requiring a long timeframe, making obtaining funding grants difficult but if prophylactic antibiotics are given, this is likely to be a driver of resistance. Anna highlighted that at present it is not known how this genetic alteration is inherited as there is no workable test, and there is no treatment. Alternatives to antibiotics such as cranberry juice and D-Mannose are available to both humans and animals, with Anna referencing the Humanimal Trust-funded work done by Dr Lucy Grist at the University of Surrey on bacteriophages.

Concluding thoughts

Anna concluded that veterinarians and paediatricians have similar problems when it comes to urology – both can't obtain a decent history, it is difficult to get urine samples and results of urine dips mean that often the treatment offered is a course of broad-spectrum antibiotics. Work by engineers at the University of York on spring boarding the design for an on-chip diagnostic tool led Anna to think of lambs and more widely how animals also develop UTIs too. She had a dog, so why weren't the two disciplines talking? Coming across Humanimal Trust online and its Humanimal Hub, she started a urology group, who meet, hold interactive talks and have written a draft paper but as yet have no suitable journal to send it to.

Mainstream media is full of stories around antimicrobial resistance (AMR) genes in relation to both humans and animals yet the two medical disciplines are not talking to each other more. AMR is more of a problem in developing countries where the pressure on food production results in antibiotics being used more readily and we need greater diagnostic sensitivity. Anna spoke of her collaboration with Test and Treat, which came about as a result of Humanimal Trust's 2021 symposium, but has spent a year trying to get this feasibility study through ethical approval. Greater diagnostic sensitivity if demonstrated in humans, has the potential to benefit animals as well.

Anna spoke of the need for a foundation to foster and build these cross-disciplinary conversations. For example, although Natural Science GCSE has been brought it, there is nothing within its syllabus on either One Medicine or One Health. Universities need to be more open, with better provision globally for human and veterinary medicine collaborations and opportunities. We need the right people who can teach One Medicine and One Health to students, provide work experience opportunities, and such knowledge needs to be mandatory but getting this into a tight medical syllabus will be difficult. We need to maintain the physician scientist and afford the right opportunities to doctors and veterinarians who can talk about tailored care. There need to be better links between veterinary practices and medical schools with sabbaticals and electives on One Medicine and One Health, together with increased funding, knowledge and targeted campaigns to increase visibility, along with opportunities to break into conferences talks, to talk about unified approaches that can offer solutions. Gaining ethical and regulatory approval also needs to become more mainstreamed.

Anna's final comment was in relation to one of her patients, Bethany. Bethany has Spina bifida, recurrent UTIs and has approximately 34% renal function. Her future is not overly positive. One Medicine may provide her with a quicker diagnosis. Bethany had recently acquired a new cat, D-Baby – Anna noticed that both Bethany and D-Baby had the same ring-like lesion on their leg, on phoning a veterinarian for advice, both had ringworm and were treated with the same drug. This is what Anna considered One Medicine was really about, treating two patients for the price on one and her final message to delegates was to collaborate, collaborate, collaborate. To view the talk please click here.

Dr Simon Doherty, Senior Lecturer (Education), Institute of Global Food Security, Queen's University Belfast, Northern Ireland, UK

One Agriculture: opportunity for collaboration through the Agri-Food sector

Simon's presentation focused on the agri-food sector, bringing the spheres of One Medicine, One Health and One Welfare into a holistic concept of One Agriculture and made reference to his involvement with Vet Sustain. Interfaces between human and animal health do not stop at companion animals but equally apply to other animal groups such as farm animals. Simon described One Health as the interface between humans, animals and the environment, including considerations in terms of the feed going into farm animals and the food going into people such as meat and dairy products. So why is there so much focus on One Health and sustainability? Simon considered that One Health is part of the journey and sustainability is the end goal, for example, that economics and the environment are in balance. However, he noted that farmers, veterinarians and environmental scientists can't achieve this on their own, but need to work with other stakeholders. Referencing outputs from Lord O'Neill's 2016 report on antimicrobial resistance (AMR), Simon highlighted differing attitudes between the two medical disciplines in terms of AMR, veterinarians considering that human medical professionals were giving out antibiotics like candy and human medical professionals considering that veterinarians were giving out antibiotics to animals by the bucket load. Clearly the two disciplines need to work collaboratively to reduce, refine and replace in terms of antibiotics and their ongoing use.

As we sit towards (hopefully) the end of the COVID pandemic, the links between people, animals and the environment have never been as important as they are now, given 75% of emerging infectious diseases are zoonotic, COVID spill over events from humans to mink and cats, particularly big cats in zoos, unprecedented rates of species extinctions and our current climate emergency. The links between the agri-food industry and our environment need balance so that we can make food production more sustainable, produce food more cheaply but without compromising the welfare of animals or the environment. This requires a multi-disciplinary approach which can convert ideas into action as the average UK farmer is not going to be an expert in all areas and there are linkages in the human medical professional, human nutrition and wellbeing with the veterinary field. For example, herbal lays and wildflower meadows improve biodiversity. Cattle and sheep wormers control the clinical effects of parasitic worms but kill the insects which break down manure and we need to strike a balance e.g., chicory can reduce the worm burden, thus reducing the number of chemical wormers required and therefore delivering reciprocal benefits, so we need to bring in knowledge from different sectors.

Simon touched on the huge impact the UK's exit from the EU has had on how food and feed is produced. Northern Ireland has 4% of the UK's human population but 17% of its cattle.

Advocates of bridging the gap between human and veterinary medicine

Simon presented a brief history of notable advocates who had attempted to bridge the gap between human and veterinary medicine. Hippocrates the 'father of medicine' made the link between human, animal and environmental health (in his writings 'On Airs, Waters and Places'). In the 19th century, Louis Pasteur linked human and veterinary medicine from an early stage and by making the link between a dog, a dog bite and boy, saved a boy's life in 1885, when the boy was vaccinated against rabies.

Also in the 19th century, Rudolf Virchow, to whom the quote that between human and veterinary medicine there are no dividing lines is attributed, was way ahead of his time with his discoveries on how a parasitic worm affecting pigs, Trichonella, was transmitted into the human food chain via undercooked meat and his contribution to the shared knowledge between the two medical disciplines in areas such as typhus, leukaemia and embolisms.

In the 20th century, the most notable advocate was Calvin Schwabe, an epidemiologist who held a joint appointment at UC Davis, USA in their medical school and veterinary school and who is credited with having coined the term 'One Medicine'. Schwabe's observations that infectious diseases could cross over between humans and animals established their link in terms of public health, which then become central to One Health.

Collaboration in action

Simon gave some examples of collaboration in action. The British Veterinary Association is the representative body of veterinarians in the UK, whilst the Royal College of Veterinary Surgeons is the UK regulatory body. The two organisations work together through the Vet Futures Initiative, which aims to prepare the veterinary profession for what it might look like by 2030 for example by setting up the UK One Health Coordination Group which has brought together the British Dental Association, British Medical Association, the National Trust, Wildlife Trusts, the British Veterinary Association and the British Veterinary Nursing Association amongst others. This joined-up approach works together to look for examples of One Health which can be showcased via a One Health Action Report.

Simon reflected on what sustainable agriculture actually means? In terms of antibiotic usage, less is better and there is a need to look at animal welfare, health and welfare plans via routine visits and better biosecurity, together with producing a number of resources on how veterinarians can talk to farmers. The Federation of Veterinarians of Europe covers the entire continent of Europe and has created pillars around greenhouse gases, innovation and a circular economy which are linked to One Health through the sustainability picture. Vet Sustain provides toolkits and resources around sustainability and has produced a greener veterinary practice checklist to enable veterinarians to empower their teams by taking small steps.

One Medicine – crossovers between human and animal health

Simon spoke about drugs that have crossed over between human and animal health. Meloxicam is a non-steroidal inflammatory drug, like ibuprofen. Although it has been toxic in humans and hence is not much used in human medicine, it is useful in treating dogs, cattle and pigs. Omeprazole is used to treat ulcers in horses and reduces the effects of stomach ulcers in both dogs and horses. Derivatives have been used in humans. Ivermectin has been referred to a lot during the COVID pandemic but it is generally considered not to be useful for treating COVID in humans. It is a wormer used for cattle but has proved useful in treating humans with river blindness in sub-Saharan Africa.

Figure 5: Examples of how veterinary medical terms have been translated into human medicine COVID speak. The word, vaccination, itself comes from a veterinary viewpoint. When Edward Jenner developed a treatment for smallpox in humans using an isolate from cowpox, he called this process, vaccination from the Latin for cow, vacca.

Final comments

Simon's presentation concluded with a short overview of the social aspects of aquaculture in rural Scotland. Is it sustainable to feed fish destined for human consumption with feed created from fish? As an example of a circular economy, by-products from human processes such as the brewery process, food waste, can be used to grow black soldier fly larvae, which in turn can be turned into insect protein which can be used to feed food fish. To view the talk please click here.

Dr Doug Brown, Chief Executive Officer, British Society for Immunology (BSI)

Joined up approaches at the British Society for Immunology

Dr Doug Brown gave an overview of the BSI, focusing on veterinary immunology. The BSI is a London based charity interacting with many individuals and organisations globally. Their vision and mission focus on better health for all (humans and animals), supporting the immunology community to drive scientific discovery forward and to make a positive impact on both human and animal health. The three main elements to BSI's strategy are: a connected community, championing careers and catalyzing change. The BSI community works as much as they can across different sectors, disciplines and career stages, supporting collaboration and co-working and encouraging researchers to get the best out of their research.

In addition, it provides lifelong career support, getting support for their members and providing support back to early career stage immunology researchers via various initiatives across the different sectors that the BSI works across. In terms of change and influencing, the BSI do what they can for their members, to build an environment that allows immunology to thrive and deliver better outcomes for human and animal health.

Opportunities

Doug spoke of the immune system being core to survival and involved in any major disease that affects humans and animals. By understanding the immune system, we can achieve an understanding of a disease, diagnose conditions, enable better prognosis, treatments and cures, either using the immune system or modifying it and in doing so, prevent different infections or potentially reduce the risk of other diseases. Doug considered there was still lots more that the BSI could do. For example, disease and research areas that are relevant to both humans and animals, including cancer, immunotherapies, autoimmunity, vaccination, allergies, transplantation and AMR together with emerging areas such as obesity, dementia, next generation cancer immunotherapies and cardiovascular disease. The real key is that it is relevant to both human and animal health but possibly more could be done to provide examples of two-way learning between human and animal research and medical practice.

The BSI and the COVID pandemic

Doug told delegates that the BSI had been busy from a pandemic perspective. Its members had identified COVID-19 as an immunological disorder where the immune system becomes over active and starts attacking organs, causing severe disease, with the BSI's response incorporating strategic approaches: research, policy and public engagement. It had mobilized researchers working in different parts of immunology, identifying skills and expertise that could be harnessed and pulled together rapidly, forming a large national consortium funded by the UK Government. The BSI's role was to bring the immunology community together, facilitating collaboration and partnership. With regard to policy, it established an expert task force, bringing the voice of immunology to the table of central government where policies were being developed and advising on the deployment of vaccines, dosage, the type of vaccine platform and number of doses needed. Finally, in terms of public engagement, the BSI ensured that the general public were able to freely access accurate, up to date information about the SARS-CoV-2 virus, COVID-19 disease and vaccines, answering common questions as they emerged and getting the information needed to people so that they could decide whether to get vaccinated, whilst the BSI's work has continued in other disease and research areas, their main focus has continued to be COVID.

How does the BSI deliver on that opportunity? Doug considered that by working across the community on how can they draw out the benefits for translation, clinical delivery and human and animal health. The BSI's membership has grown and its community is engaging, at currently over 4500 members, a membership rate which has doubled in the last 4-5 years, with engagement across different sectors, career stages and disciplines.

Beyond COVID

Future directions of the BSI are in the area of human autoimmunity disorders with £1 million of funding to research the biological mechanisms that run across different disease areas and in terms of new treatments, new ways of diagnosing, cancer and immunology. The BSI is supporting more careers than ever before and this is crucial to One Health and One Medicine, pushing areas of research as there is a need to communicate these concepts at the early career stages so that such researchers see this as an attractive area to move in to and to pursue a career in. Other areas of work include mentoring opportunities, providing career enhancing grants, making immunology look attractive across different sectors and disciplines and three academic journals.

The BSI provides a collective voice and influence for change by bringing clinicians and researchers together. Membership is available to all those with a professional interest in immunology. They receive equal access to all of the benefits and events that they offer with opportunities for public engagement through to high level policy influencing and by the formation of several groups, once of these being the BSI Comparative Veterinary Immunology Group. They also have close ties with key institutes such as Pirbright and Moredun and the International Veterinary Vaccinology Network, which brings together key players in the veterinary vaccinology space, together with the BSI Congress, comprising four days of discussions on immunology, human and animal health.

Cross pollination facilitating two-way learning - case study – Veterinary Vaccines report

As a case study, Doug spoke about the Veterinary Vaccines report which aimed to demonstrate what is, and would could be, achieved from a career in this area of research by building capacity. The report's five key findings and outcomes are relevant to both One Medicine and One Health i.e., two-way learning, exploiting synergies in areas of research, the breakdown of human and animal health silos, the provision of opportunities for early career researchers and the significant economic benefits. It is an area that requires longer-term secure funding but represents an attractive prospect to industry. The report summarises that the UK could be a world leader and global beacon in immunology. To view the talk please click here.

Panel Q&A session

Chair: Dr Ben Marshall, Consultant Physician in respiratory medicine and Humanimal Trust Trustee.

Question: "Emphasis on the importance of replacing animal experiments, but developing and testing vaccines for animals involves significant animal use and can cause severe suffering. How do you reconcile this?"

Simon said that vaccines need to be shown to be safe and efficacious so there will always be a 'pre-marketing' piece that needs to be played out. In agreement with the questioner, Simon continued that there needs to be renewed discussion around agile regulations. At present, for a vaccine product to prove that it is safe and efficacious, there is a need to carry out testing and provide a dossier as per EU Pharmacopoeia reference requirements. However, moving forwards, the increased power of studies means that the number of animals can be adapted and this can be reduced right down. Focusing on the 3Rs, can we replace; can we use predictive models and algorithms to predict the value of recombinant antigens in vaccine production. The best way to reduce the number of animals is to increase the power of the study which will lead to a level of refinement. Many vaccines use sub-clinical doses as part of challenge models, the increased power of immunology and immunological techniques such as fluorescent cell sorters, which were not being used 10 years ago are providing an increased power of diagnostics, which needs fewer animals. But a balance needs to be struck, there will need to be a reconciliation in terms of cost to benefit and some of this comes back to agile regulation. 10 to 15 years ago similar diagnostics were being used for biotoxins tested on animals but we have managed to move away from this and we need to use all of the tools in the toolbox to reduce and replace animals used in vaccine testing. There is a piece to be played out in regulation such as not duplicating animal testing for different regulatory bodies and there is a global effect looking at similar dossiers across certain nations such as Europe, North America and Japan. Simon concluded that there is lots of work going on and animal testing does not need to be replicated for different markets and the scope for using the same data sets for marketing (authorization) but ultimately discussions with regulators are needed to take this forward.

Deborah said that we all want to minimize suffering for all humans and animals, but we don't live in a perfect world. We need to minimize what is perceived as suffering and she believed laboratory animal veterinarians are going out of their way to make sure their patients are as comfortable as possible. By working with researchers, we can eventually reach a day where we won't need to use as many animals, given the huge advances that have been made in the last 20 years alone but we need to work together.

Anna talked about vaccines such as the Bacillus Calmette-Guérin (BCG) vaccine being used to treat adult human cancers. The value of laboratory work and the speed at which technology is advancing mean that there is hope in the future that we will reach a position where we don't need to use animal testing for any vaccine, be it for human or animal use. She emphasized that if you want to be successful in grant applications, you need to demonstrate that you are sticking to the 3Rs principle, especially for funding from charities. We need to hone research and use technology available to reduce the suffering of animals in the laboratory.

Question: How much could artificial intelligence (AI) play a role in this respect.

Simon considered that the predictive values of AI in the likely success of antigen technologies, in and around some of this modelling had been achieved a lot in reducing the number of candidates for human COVID vaccination. Roberto added that AI was used very much in research and development and diagnostics from a cancer perspective in terms of comparative pathology. If you can more accurately detect if you have an invasive tumour, you are automatically reducing the number of animals. Ben added that in terms of radiology, AI was coming on in leaps and bounds. Anna referenced the use of AI in robotic surgery, but cautioned that any mathematical modelling was only as good as the quality of the data that is put into it. Good quality data needs to be going into such models for AI systems to work and that in terms of research, the question needs to be very specific and the outcomes well defined.

Question: Considering the challenges faced by One Medicine due to the lack of a widely recognised definition, how could such a definition could be developed or promoted further as has recently occurred for One Health. How can organisations such as Humanimal Trust spearhead promotion of a similar definition for One Medicine to help educate the public as well as future veterinary and medical schools?

Simon cautioned not to go round in circles to come up with a definition that suits everyone. A definition for One Medicine would be useful in being able to communicate what it means. Any definition for One Medicine needs to be functional and the Trust need to consider how they will go about communicating this, including the need for trans-disciplinary collaboration in the medical space.

Deborah shared her recent experience at the Geneva Health Forum where a good number of the 26 members of the One Health High Level Expert Panel were in attendance, talking about their definition of One Health which was published on 1 December 2021. They had said publicly that their definition was a living document and working definition and with more research, it is changing. She saw One Medicine as an essential component of One Health, the latter with overarching themes of human, animal and environmental health, but we cannot have these without the relationships that are created by One Medicine.

Anna commented that definitions come up at conferences and you end up going round and round in circles. In her opinion, a human medical student practices holistic medicine, the word 'holistic' ties in pathology, species, the family that surround that patient and the environment that they are in. To her, One Medicine is the discipline of treating the patient in front of you and that oneness is collaborative working between the disciplines under the umbrella of One Health but we need to start that process of thought from an early age as One Biology being considered as holistic.

Closing remarks

Dr Ben Marshall summarised that the seminar had provided overarching themes of passion and shared commitment to the One Health and One Medicine agendas leading to extremely stimulating debate.
He thanked Deborah for her elegant stories and demonstration of the impact that is possible when professionals talk across disciplines. Her talk had hammered home the message of thinking of the whole, not just the human or animal patient in front of us.

He thanked Anna for sharing her experiences of the barriers to One Medicine, together with the challenges she had faced to become a human doctor. The challenges facing the medical workforce are not going away. They have been brought to the fore by the impact of the pandemic on the junior workforce and how seniors must support juniors, the same being applicable to veterinary medicine.
Ben noted that Simon had emphasized the opportunities for interdisciplinary collaborations in the agri-food sector, regenerative agriculture, sustainability and circularity. Simon's talk had touched a chord with the audience, particularly the parallels between agricultural practice and the language they use which has since passed over into human COVID response speak.

Doug's talk had illustrated the loud and clear vision and mission of the BSI in their support of the immunology community and how they are driving the agenda forward on a journey of discovery in areas such as cancer and immunodeficiencies, along with the drive for interdisciplinary collaborations.
Ben concluded that the seminar had created a beacon for the One Medicine agenda and that it had provided a good springboard to get everyone energized and motivated to drive this agenda forward.

Conclusion: Looking to the future

- Our seminar highlighted that One Medicine is currently seen through a kaleidoscope of lenses as regards its aims, objectives and relationship to other concepts such as One Health, One Welfare etc. These terms are not synonymous but each represents an interdependent ecosystem. Each can learn and contribute to the development of the others due to their commonality of interests. If One Medicine is considered the progenitor by which human and veterinary medical professionals initiate, foster and develop collaborative conversations, then is it the golden thread which binds them together?

- We need to alter the lens through which One Medicine is viewed, moving away from public health agendas to agendas focused around common health for both humans and animals, which are capable of delivering circular benefits and the principle of reciprocity. In addition, we must shift focus from human relevant research to *humane* relevant research and the eventual obsolescence of experimental animal testing.

- There are plenty of examples of real joined-up approaches. For example, One Medicine, One Health and One Welfare have been brought together in the agri-food sector as One Agriculture, echoing a theme from our Founder at our 2021 symposium on the essence of 'Oneness'.

- We learnt about unified initiatives developed by the BVA and RCVS such as the UK One Health Coordination Group which has brought together a diverse range of professionals to promote diversity of thought. In addition, there is much that can be learnt from the example of the BSI, who have unified their members across many different sectors, disciplines and career stages, enabling them to have a united voice and an opportunity to shape influencing.

- If we are to raise greater awareness of the benefits of collaborative relationships, as espoused by One Medicine, then we need to clarify and emphasise its meaning with a consistent definition incorporating historical commonalities between the two medical disciplines and the benefits of collaboration. At the same time, we must ensure humane values prevail by embracing the principle of reciprocity so that not only do medical practitioners and allied researchers benefit, but also patients, regardless of the patient type. This is a message promoted by Humanimal Trust and a message that all those in the One Medicine community must communicate. If these conversations do not exist, we must create them but to do so, we need the skills to effectively articulate and communicate the science behind One Medicine to a diverse audience.

- Opportunities need to be more regularly available for medical professionals and researchers to come together both informally and formally. It is critical to ensure human medical students are provided with ample opportunities to meet their veterinary counterparts, whilst they can still see the bigger picture and before they enter increasingly smaller silos and are enveloped in their own bubbles. Can we break a One Medicine approach down into small, achievable steps by talking more about how medical professionals can 'be more One Medicine' in their everyday lives? Does Humanimal Trust need to follow the Vet Sustain example, providing resources and checklists to human and veterinary professionals and allied researchers – it could be as simple as just inviting their counterpart for a chat over a drink.

- Can we start a conversation on how not only the two disciplines can learn from and develop each other, but also One Health and One Medicine? Can we engage with learned societies such as the BSI to provide a unified voice? To meet the healthcare challenges faced by both humans and animals, we will need all the tools in the toolbox along with agile approaches. If we can harness the collaborative power of One Medicine to create, foster and forge such collaborations, then together we can build a society which will deliver reciprocity to both humans and animals.

Acknowledgements

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Find out more and stay in touch

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