International Society on Aptamers

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EDITORIAL

Hi All,

And welcome to the last issue for 2022. I hope you've all been achieving what you hoped to achieve since the last issue. And if you missed it, please go to the Society's webpage and have a read. It really was a bumper issue with lots of information. Not to say this one isn't. We've been quite busy in the last few months watching the results of some clinical trials in Europe and we're very pleased to report that we managed to chat with a few groups from the companies involved (See page 5). Not to be outdone by the clinical trials using aptamers as therapeutics, we have also been following along and watching Nutromics, based here in Melbourne, expand and start their first clinical trial of a 'lab on a patch'. You might have been present for Rob Batchelor's talk at the Aptamers conference this year. But I've written a little piece about them too. What a time to be working with aptamers and seeing years of research come to fruition!

We would like to start to showcase some interesting applications of aptamers so if you have published a research article recently and want to highlight it to members of the Society, please get in touch. You can find all the contact details in the newsletter. We aim to publish 3 issues a year so the deadlines to submit a short summary will be Feb 28th, June 30th, and October 30th. We will also have more to say on our ECR Arm of the Society in the new year and we will be chatting to all interested parties at the conference.

As a final note, have you liked our Facebook page? We are currently providing links to new aptamer research papers on a daily basis. Don't have time to keep up to date on current literature? Get our daily updates in your morning newsfeed at https://www.facebook.com/AptaSoc/. Please don't forget to also follow us on twitter (@Aptamer Society, @Japtamers).

Quick question before I sign off this editorial – have you seen the increase in articles about aptamers in what I'd call mainstream science? If you see one, can you send it to me or tag me on LinkedIn? We have all of our normal news items as well, so with that, I will sign off this editorial and let you read through our newsletter. As always, we hope that you are all healthy, happy, and successful with all your endeavours. I'll add sane as well as we approach the silly season. See you all in 2023!

Associate Professor Sarah Shigdar
President

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Prof Maureen McKeague
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https://twitter.com/aptamer_connect.

Aptamer Symposium 2023 – Sarah Shigdar

While the pandemic meant we shifted to online conferences for a few years, the Aptamer Symposium was bask in person AND online in 2022 and we are continuing this platform for 2023. I am hoping to be in attendance at the Symposium in person, and I'll be missing my cat who made such a big impression to the audience in 2022. While it is good to catch up with everyone in attendance, we understand that for a number of reasons, not everyone is able to travel, it is a good opportunity for those to attend virtually instead. We will be running our rapid-fire flash talks on both days again and ensuring that we have time zone friendly sessions for those logging in online, so do please register so you can share your work and build on your collaborations. We're excited to announce *Larry Gold* and *Ichiro Hirao* as our 2023 keynote speakers, and that currently both are planning to attend in person! If you've heard either of them present at conferences previously, you'll know how enthusiastic they are when talking about their research. We also have an extensive list of other announced speakers and we are continuously adding to the list. So please, check out the website, http://libpubmedia.co.uk/aptamers-2023 for more details. Also note that, for our 10th anniversary conference, we are back where it all began, at St Edmund Hall. I had a look through the archives and can bring you this photo, of all attendees at the first conference, in 2014!

From the Editor

If you have anything you would like to see in the next issue of the INSOAP newsletter, send it directly to sarah.shigdar@deakin.edu.au.

Aptamers Journal

We announced the official journal of INSOAP at Aptamers 2017. Please email us at aptasoc@gmail.com to express your interest in joining the editorial or reviewer team. Please see http://libpubmedia.co.uk/aptamers/ to submit your article.

Can aptamer-drug conjugates increase the maximum tolerated dose where antibody-drug conjugates fail to? – Sarah Shigdar

Cancer therapy does not need to be elegant. It just needs to do the job is was designed for, which is to kill cancer cells while leaving healthy tissue alone. When immunotherapy was being discussed in research circles more than ten years ago, we already knew that there were limited patients with solid tumours who had tumour infiltrating lymphocytes [1]. We also knew that cancer cells were inherently hungry and had a tendency to engulf anything they thought was 'food'. One suggestion on how to fix this was to block endocytosis, but this was again a non-specific agent that would block all cells from ingesting required substances. Another option proposed was to use bifunctional or bispecific antibodies that engage with the immune system cells and pull them along into the tumour [2]. However, work continued on finding the Holy Grail that would make immunotherapy more effective, rather than taking some of these qualities of cancer cells into account. It was, therefore, good to read an article in Nature Medicine published in April, 2022 that suggested we might be seeing the end of antibody immunotherapy for some cancers but a repurposing of these antibodies [3]. The suggestion was to conjugate drugs to these antibodies and use the inherent properties of cancer cells to deliver drugs inside. There had been a few examples of these over the years, with a ramping up in the last few years. There are currently 12 antibody-drug chemotherapeutic conjugates (ADCs) approved, with more than 10 times as many in clinical trials. It is suggested that this form of drug delivery would increase the maximum tolerated dose while reducing side effects. Recently, a paper has been published

which looked at many of the current ADCs and compared them, where possible, with their free drug counterparts. Interestingly, what they found was that these ADCs are rarely able to increase the drug dose in patients [4]. This fact would seem counterintuitive. However, it is not necessarily due to the drug attached to the antibody, but often the attachment that is used to connect the antibody and the drug, or the antibody itself that limits the effects of these drugs, while also causing other side effects in the patients. Additionally, a recent systematic review demonstrated that almost 50% of cancer patients (>22,000) experienced grade 3 or 4 adverse events [5], suggesting that there is still a way to go before these antibody-drug conjugates become more tolerable.

Having worked with aptamers, simple strands of RNA or DNA nucleic acids that fold into a complex three-dimensional shapes and bind like an antibody, they can be utilised quite effectively in similar applications to antibodies, but with few of the side effects and no adverse events to date when used therapeutically. Attachment of drugs to the aptamers is also very simple, given their thermal stability and the use of linkers or click chemistry reactions. Indeed the simplest form of an aptamer-drug conjugate is seen with doxorubicin (Dox) [6]. The mechanism of action of Dox is to intercalate into double stranded DNA. One only needs to look at the two-dimensional proposed structure of an aptamer to see that most aptamers possess a double stranded stem region which stabilises the 'binding loop' that can be optimised for Dox intercalation. What makes this such a simple targeted therapeutic is that this conjugate is stable at physiological pH but breaks apart due to protonation of Dox when the pH drops once within the lysosome, allowing the drug to move through the cytoplasm and into the nucleus, where is continues to be functional.

An additional benefit of aptamers is their small size, often 10-15 times smaller than antibodies, which allows them to penetrate further from the blood vessels in solid tumours and they have also been compared both in vitro and in vivo, with antibody and aptamer penetrance in tumoursphere and xenograft models that demonstrated the aptamers possessed superior properties [7]. A further benefit of aptamers that allow them to avoid the 'binding site barrier' is their tunable binding affinities, allowing them to have a more clinically relevant binding affinity to their target to minimise on-target off tumour effects. This was compared in a study that looked at the binding affinities versus tolerability of five EpCAM antibodies, with the lower binding affinity being better tolerated as it did not bind to targets expressed on healthy pancreatic cells, thus not causing pancreatitis and reducing non-tumour antigenic sinks [8]. As aptamers are nucleic acids, there is also no risk that they would be trapped by albumin in the blood stream following injection.

Finally, it is imperative that the presence of the biomarker is determined prior to treatment, which should ideally be performed with the exact same agent used to deliver the drug. This is due to some biomarkers losing epitopes, which may prevent the targeting agent from binding effectively to the cancer cells. For antibodies, this may not be possible as some antibodies cannot be used in diagnostic assays. For aptamers, the majority of them can be used in diagnostic assays with a simple addition of a reporter molecule [9].

While there has been no clinical data released for aptamer-drug conjugates, there are a number progressing to phase I trials. However, the recent trial results of aptamers for therapeutic applications in Phase I and Phase II clinical trials suggests that there will be less need to re-engineer these conjugates [10], compared to the current antibody-drug landscape, during clinical development for better tolerability and better quality of life. It is hoped that these modalities, either as single agent or in combination with other therapies, will improve the prognosis for cancer patients in the not too distant future.

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'Lab on a patch' – clinical trials of a wearable biosensor – Sarah Shigdar

Image of the 'lab on a patch'. Taken from Nutromics.com

For those of you who were in attendance at Aptamers 2022, you may remember Rob Batchelor giving a talk on Electrochemical aptamer-based sensors: a platform technology supporting seconds-resolved, real-time molecular monitoring in the living body. If you did hear him, you might have seen that he was Head of Biosensors at a company called Nutromics. Nutromics has a special place in my heart for two reasons: One is that they are based here in Melbourne, Australia; the second is that I have known Peter Vranes and Hitesh Mehta, co-founders, since they first started talking about using aptamers in a wearable biosensor. Fast forward several years, and keeping with the theme of clinical trials, they now have a product in phase I clinical trials. Their first biosensor targets vancomycin levels, an antibiotic that has a very narrow therapeutic window and is highly toxic but is commonly used in hospitals to treat infections. Typically, these patients are subjected to frequent blood tests each day while on treatment, which gives a snapshot at a point in time of what the dose of drug is doing. As the dose is very patient-centric and dependent on the patient's overall health and what their kidney function is like, the dosing may not be effective because clinicians may be overly cautious. What Nutromics have developed is a biosensor that measures continuously and in real time, which in my personal opinion is so very cool. This allows clinicians to dose much more appropriately, treat better and more effectively, and saves lives!

While Nutromics' focus has been to get this 'lab on a patch' into clinical trials for vancomycin to save lives by allowing clinicians to properly dose patients, they have a very large portfolio of

aptamers for other medical indications, whether they are drugs, proteins, or metabolites, for conditions such as kidney disease. While it hasn't all been smooth sailing since Nutromics was formed in 2017, the last 12 months has seen exponential growth and a lot of capital raising (to the tune of US$20 million) and what looks like a bright future for not only the team at Nutromics, but for aptamers in biosensors. Keep an eye on this 'lab on a patch'. It will be coming to a town near you within the next few years!

The Team at Nutromics celebrating Christmas 2021

Aptamer therapeutics clinical trials – Sarah Shigdar and Maryam Nakhjavani

I don't know how many of you have been following along with the clinical trial results that we've been seeing lately but I've been watching and have been very excited with what I've seen. I've also been incredibly lucky to speak to the scientists at a few of these companies. Let's start with NOXXON, who have now rebranded to TME. Most of you would have heard about NOXXON, based in Germany, and their lead candidate, NOX-A12 (modified L-Spiegelmer), that targets stromal cell-derived factor 1 (SDF-1), AKA C-X-C motif chemokine 12 (CXCL12), which is a cytokine found in the tumour microenvironment. While NOXXON have been testing NOX-A12 in clinical trials for a number of cancers (glioblastoma, multiple myeloma, myeloid leukaemia, colorectal, pancreatic), it's been the results of the phase I/II GLORIA trial that has really made my colleagues sit up and take notice of aptamer therapy. I'm not saying my colleagues weren't aware of the fact that aptamers could be used – they've obviously heard me babble on about them for so long – it's that the results in glioblastoma in combination with radiotherapy and/or bevacizumab have been so impressive. In results presented at Society of Neuro-Oncology (SNO) in November, the combination of radiotherapy with bevacizumab and NOX-A12 showed a partial response in all treated patients and the best part is that there were no dose limiting toxicities, with only 3 grade 2 adverse events that had no issue with tolerability.

The first person we spoke with was Axel Vater, PhD, who used to work for NOXXON and his enthusiasm for this drug was overwhelming. There had been a few setbacks, as there always are, but to see the results now is an amazing journey. Axel has now become the Founder and chief scientific officer of Aptarion Biotech, where their focus is on acute disease states, using AON-D21

(also a modified L-Spiegelmer) to target C5a for immune modulation. Listening to Axel talk about the development of this aptamer, we were reminded how the high specificity of aptamers can be detrimental in terms of translational studies. While AON-D21 was cross-reactive to mouse and human, it wasn't in the larger mammal studies so couldn't provide the necessary safety studies. It wasn't until they completed crystallisation studies that they realised there was one amino acid different that prevented it from binding. That knowledge led them to discover one other model species they could confirm safety in. They have completed an initial single ascending dose study to demonstrate safety and are in the process of completing a further ascending dose trial. And while they haven't disclosed which condition they will be going to further clinical trials for yet, they have recently received a grant for Covid-19 from the German Ministry of Research and Education to get AON-D21 ready for phase II to get more GMP grade manufactured.

The next company we spoke with who had also completed phase I clinical trials was aptaTargets, and we sat down with David Segarra, MBA, MSc, the co-founder and CEO, and David Pineiro, PhD, the chemistry manufacturing and control and program manager for a new aptamer under development. For a bit of background, AptaTargets was spun out of Aptus Biotech in 2014 based in Madrid to focus on an aptamer (ApTOLL) that was developed to toll-like receptor 4 (TLR4) for use in acute stroke patients. This aptamer is a 59-nt DNA aptamer that is unmodified and has a half-life in human blood of around 9 hours. Their phase I first-in-human in healthy volunteers was completed in 2019 and 2020. They do have results from a phase Ib/IIa in acute ischemic stroke completed earlier this year and the results are very exciting for both safety and efficacy. You'll have to watch this space for the full results though as that will be presented at the International Stroke Conference in February 2023. While the new results are under embargo at the moment, we asked how the team felt when they conducted their first treatment in a healthy volunteer. Obviously there was a bit of trepidation after previous trials with other aptamers had shown some adverse effects, but once the first dose was done, the team started to get excited about the possibilities in the future. The way that David S and David P's faces lit up when talking about the journey was both exhilarating and humbling. Now that ApTOLL has been tested in 16 hospitals and treated 151 patients across Spain, France, and Germany in the APRIL phase IIa clinical trial, we at INSOAP are very excited to see an expansion across Europe and maybe here in Australia.

The last company we spoke to as part of this series is also based in Spain and is a preclinical company called Aptadel Therapeutics that is working on developing modified RNA aptamers to EphA2 to deliver therapeutics to Ewing sarcoma. We sat down with Gisela Lorente, PhD, CSO, and Gonzalo Fernandez-Miranda, PhD, head of drug discovery. While they were spun-out in December 2020, they are anticipating beginning clinical trials in paediatric patients in about 18 months to two years. Their journey is ahead of them in terms of finalising the pre-clinical data and then choosing which country to start their clinical trials in. In addition to the initial aptamer delivery vehicle proposed for the first trial, they are developing this as a platform technology for delivery of a variety of therapeutic modalities. And while Aptadel Therapeutics is at the beginning of their journey moving to clinical trials, they were recently recognised the Eurostars with a grant that will help with completing the work needed to see the next step in their journey.

Interview with a researcher: *Prof. Maria DeRosa* – Maureen McKeague

I cannot think of a more impressive or inspiring role model than Dean Maria DeRosa. Maria DeRosa is one of the top aptamer experts, doing diverse aptamer research within her LADDER (Laboratory for Aptamer Discovery and Development of Emerging Research) at Carleton University, Canada. I was lucky enough to join her chemistry lab right when she started as an Assistant Professor at Carleton University in 2006. Over the past 16 years, her lab has "exploded" in terms of the diversity and impact of research. Her group developed new aptamers, new aptamer methodology, and brought aptamers into novel areas including Parkinson's disease research, food safety, and sustainable agriculture. What is most impressive to me is that Prof. Maria DeRosa motivates her group to make important contributions in these fields while also creating a very supportive and fun atmosphere. She has always managed to have one of the largest research groups at Carleton University, welcoming graduate students, undergraduates, and researchers from chemistry, biochemistry, neuroscience, engineering, and more. And yet, she continues to find time for each student and each project. It is therefore not surprising to me that she has won countless awards for her innovative research, teaching, and exceptional mentorship. Most recently, she has taken on the very challenging and prestigious role of Dean of the Faculty of Science at Carleton University. Despite this exceptionally busy schedule, I still hear glowing reviews about her contributions, support, and energy from her group members. And luckily, she was able to sit down with us to share her insight on aptamer research here!

Q1) How did you become interested in the field of aptamers?

I was trained as an inorganic chemist and during my Ph.D. I was working on developing materials for different sensing applications. My main struggle was often with specificity. I changed gears for my PDF and I started working with DNA for electrochemical sensing of DNA damage, and it was in during all my readings that I came across aptamers. I was already in love with DNA for its programmability and predictability – now I learned that I could apply this amazing material to detect things beyond other nucleic acids or DNA damage. I was hooked!

Q2) From your point of view, what is unique about aptamers?

Besides all the amazing capability that comes from being built from nucleic acids, I think that aptamers stand apart as molecular recognition technology because of their accessibility. Of

course, aptamer research is complex and full of potential pitfalls, but it has a low barrier to entry. With very minimal resources, some basic equipment, and a foundational understanding of biochemistry/biotechnology techniques, you can start to access truly remarkable molecular recognition technology. I think this is evident based on where aptamer research is taking place around the world. This work isn't limited to mega research-intensive universities. Even folks from primarily undergrad institutions from across the globe are able to contribute. And many start-ups are popping up with aptamer-technology as their backbone (pun intended). I think this means that aptamer research is going to be really ripe for innovation because of how many people can participate.

Q3) What do you think is the future of aptamers?

I think that capitalizing on the benefits of aptamers will allow us to really find that niche in molecular recognition and make a major impact. Let's think of sensing as one example. We know that if you have unlimited resources in terms of money and equipment that we can make amazing aptamer-enabled technology, we see it in journal articles every day. But let's think about where we can make a real difference: the relatively low cost and stability of aptamers – let's exploit that by using aptamers in inexpensive screening technology for use in the field. Sometimes those practical advances don't make for the flashiest papers, but I think that is one place where we can actually see aptamers holding their own in a major way.

Q4) What are the major challenges that need to be solved?

We have work to do around the reputation of aptamers as reliable molecular recognition agents. Reproducibility guidelines for publications, like what has been recently published in Aptamers Journal, will help.

Q5) Tell us about your research.

We have a pipeline of projects from selection of new aptamers, to new approaches for aptamer characterization, to aptamer applications in health, food safety, and agriculture. One of the most exciting projects we have on the go right now relates to using aptamers as components of coatings for something we call a "smart fertilizer". The idea is that an aptamer recognizes root exudates that are essentially starvation signals from the crop and target binding leads to a conformational change within the coating that leads to greater release of the nutrient. We started field trials this past summer and we had some really interesting results! Lots of questions still need to be answered and we'll need to find ways to reduce the cost but it has been really exciting to see what aptamers have been able to accomplish!

Q6) How did you find out about the INSOAP?

I first heard of INSOAP many years ago as part of the Aptamers UK conference. The newsletter has been an amazing way to stay up to date with the community as well!

Q7) How do you support the INSOAP? (yikes I should probably do more!)

I really love the social media updates on new papers in aptamer research. I try to share those to help promote the work of our colleagues! I've participated by doing reviews for the Aptamers journal as well.

Q8) What kind of advice can give to the young researchers about aptamers?

The aptamer community is an amazing one and you should try to reach out and network. So many great people work in this field, and my experience has been that everyone has been willing to help me and they are all so passionate about the importance of working together to raise the

profile of aptamers. So don't be worried about reaching out! Also, aptamers are not a magic bullet and they won't solve every problem we can think up with other molecular recognition element, like antibodies. But I am constantly amazed by the creativity of new researchers and how they are pushing the boundaries of what aptamers are capable of. So, don't be afraid to try something crazy and explore your ideas!

Q9) What is your personal philosophy on life and science?

I'm here to learn and to serve! I love doing science because I am constantly learning new things and (I hope) I am contributing to humanity in my small way.

Q10) What was your favorite part about research?

Definitely the opportunity to work with creative students and postdocs, watch them grow and then thrive outside of my lab in their own chosen careers.

Q11) What do you like to do in your free time?

Free time? Haha! I'm the Dean of Science here at Carleton University so juggling administration and research takes up a lot of my time. I also have two boys who love hockey so I spend a lot of time at the rink. I love cooking when I have time to plan something out and try new cuisines!

Q12) Any other fun facts/tidbits you'd like us to know!

One of my proudest moments as a PI was when my students, on their own and with only a suggestion from me, entered and won the 2010 Science Magazine's Dance your Ph.D. competition by dancing the SELEX process. I still love watching that video. The students in that video are now doing amazing things in their own career and so it makes me so proud!

INSOAP updated list of recently published aptamers – Maureen McKeague and Sarah Shigdar

Here are newly reported aptamers since our last issue to 12th December. What a list! We only report aptamers that have been characterized with a dissociation constant (Table 1). Typically, we make use of PubMed to identify newly published aptamers with the keywords "aptamer" and "SELEX". If we have missed any newly reported aptamers, please let us know (maureen.mckeague@mcgill.ca). Readers should consult the literature (link provided) for verification and further information.

Table 1: Newly-reported aptamers published since our last issue.

Link	Target(s)
https://pubmed.ncbi.nlm.nih.gov/36508287/	*Escherichia coli*
https://pubmed.ncbi.nlm.nih.gov/36493638/	*Bacillus cereus*
https://pubmed.ncbi.nlm.nih.gov/36480127/	Multiple myeloma immunoglobulin
https://pubmed.ncbi.nlm.nih.gov/36459499/	Esophageal squamous cell carcinoma
https://pubmed.ncbi.nlm.nih.gov/36449359/	methotrexate
https://pubmed.ncbi.nlm.nih.gov/36441874/	Estradiol and Estrogenic Compounds
https://pubmed.ncbi.nlm.nih.gov/36430340/	*Zika and Dengue*
https://pubmed.ncbi.nlm.nih.gov/36426669/	Leptospira
https://pubmed.ncbi.nlm.nih.gov/36421085/	Amnesic Shellfish Toxin Domoic Acid
https://pubmed.ncbi.nlm.nih.gov/36414190/	Foot-and-mouth disease 3ABC
https://pubmed.ncbi.nlm.nih.gov/36394510/	Uric acid
https://pubmed.ncbi.nlm.nih.gov/36375248/	Interleukin 17A

https://pubmed.ncbi.nlm.nih.gov/36354154/	amantadine
https://pubmed.ncbi.nlm.nih.gov/36339252/	angiotensin II type 1 receptor
https://pubmed.ncbi.nlm.nih.gov/36332135/	*Mycobacterium tuberculosis* DevR/DosR
https://pubmed.ncbi.nlm.nih.gov/36315328/	*Staphylococcus aureus*
https://pubmed.ncbi.nlm.nih.gov/36293073/	*Arabidopsis thaliana* Roots
https://pubmed.ncbi.nlm.nih.gov/36290985/	Aflatoxin B1
https://pubmed.ncbi.nlm.nih.gov/36290442/	Carcinoembryonic Antigen
https://pubmed.ncbi.nlm.nih.gov/36287974/	α-Conotoxin MI
https://pubmed.ncbi.nlm.nih.gov/36267907/	milk allergen α-lactalbumin
https://pubmed.ncbi.nlm.nih.gov/36245127/	Cas9
https://pubmed.ncbi.nlm.nih.gov/36215718/	Human Vascular Endothelial Factor 165
https://pubmed.ncbi.nlm.nih.gov/36208449/	conserved terminal dipeptides
https://pubmed.ncbi.nlm.nih.gov/36202193/	nandrolone
https://pubmed.ncbi.nlm.nih.gov/36188221/	Cancer hypoxia
https://pubmed.ncbi.nlm.nih.gov/36184119/	galectin-7
https://pubmed.ncbi.nlm.nih.gov/36171412/	Retinoblastoma
https://pubmed.ncbi.nlm.nih.gov/36165950/	Sterigmatocystin
https://pubmed.ncbi.nlm.nih.gov/36150472/	malachite green and leucomalachite
https://pubmed.ncbi.nlm.nih.gov/36146678/	Zika
https://pubmed.ncbi.nlm.nih.gov/36144553/	Immunoglobulin E
https://pubmed.ncbi.nlm.nih.gov/36140086/	Florfenicol
https://pubmed.ncbi.nlm.nih.gov/36136560/	Gonyautoxin1/4
https://pubmed.ncbi.nlm.nih.gov/36109302/	clinical bacterial strains
https://pubmed.ncbi.nlm.nih.gov/36105684/	Zika NS1 protein
https://pubmed.ncbi.nlm.nih.gov/36087171/	Zika
https://pubmed.ncbi.nlm.nih.gov/36080490/	Interferon-Gamma
https://pubmed.ncbi.nlm.nih.gov/36071267/	*Citrobacter braakii*
https://pubmed.ncbi.nlm.nih.gov/36070569/	Sulfonamides
https://pubmed.ncbi.nlm.nih.gov/36068048/	ethyl carbamate
https://pubmed.ncbi.nlm.nih.gov/36067867/	*S. Typhimurium*
https://pubmed.ncbi.nlm.nih.gov/36058195/	*Aeromonas salmonicida*
https://pubmed.ncbi.nlm.nih.gov/36049339/	chlorpromazine
https://pubmed.ncbi.nlm.nih.gov/36049338/	acephate
https://pubmed.ncbi.nlm.nih.gov/36012844/	*Candida albicans, C. auris* and *C. parapsilosis*
https://pubmed.ncbi.nlm.nih.gov/36005012/	*Yersinia enterocolitica*
https://pubmed.ncbi.nlm.nih.gov/36004970/	Ammonia
https://pubmed.ncbi.nlm.nih.gov/35990694/	Connective tissue growth factor
https://pubmed.ncbi.nlm.nih.gov/35949145/	SARS-CoV2
https://pubmed.ncbi.nlm.nih.gov/35931009/	levamisole
https://pubmed.ncbi.nlm.nih.gov/35916160/	Metamitron
https://pubmed.ncbi.nlm.nih.gov/35910789/	Cell surface vimentin
https://pubmed.ncbi.nlm.nih.gov/35909647/	Adenosine
https://pubmed.ncbi.nlm.nih.gov/35889390/	tyrosine kinase domain of the NT-3 growth factor receptor
https://pubmed.ncbi.nlm.nih.gov/35887092/	*Roseburia intestinalis*
https://pubmed.ncbi.nlm.nih.gov/35878207/	Snake venom toxins
https://pubmed.ncbi.nlm.nih.gov/35870338/	Okadaic acid
https://pubmed.ncbi.nlm.nih.gov/35846753/	Multidrug-Resistant Acinetobacter baumannii
https://pubmed.ncbi.nlm.nih.gov/35829681/	CD19 and CD20
https://pubmed.ncbi.nlm.nih.gov/35792891/	CD49c
https://pubmed.ncbi.nlm.nih.gov/35776646/	DNA-binding protein
https://pubmed.ncbi.nlm.nih.gov/35776386/	*Staphylococcus aureus, Streptococcus agalactiae*, and Escherichia coli
https://pubmed.ncbi.nlm.nih.gov/35762921/	Amyloid precursor protein
https://pubmed.ncbi.nlm.nih.gov/35752088/	netilmicin
https://pubmed.ncbi.nlm.nih.gov/35748608/	SARs-Cov2
https://pubmed.ncbi.nlm.nih.gov/35731347/	antimicrobial peptide
https://pubmed.ncbi.nlm.nih.gov/35700936/	Lipopolysaccharide
https://pubmed.ncbi.nlm.nih.gov/35671696/	amyloid beta
https://pubmed.ncbi.nlm.nih.gov/35616277/	methicillin-resistant *Staphylococcus aureus*

https://pubmed.ncbi.nlm.nih.gov/35594734/	*Weissella viridescens*
https://pubmed.ncbi.nlm.nih.gov/35567939/	Interleukin-23
https://pubmed.ncbi.nlm.nih.gov/35556210/	diazinon
https://pubmed.ncbi.nlm.nih.gov/35534270/	β-casomorphin-7
https://pubmed.ncbi.nlm.nih.gov/35491395/	SARS-CoV-2
https://pubmed.ncbi.nlm.nih.gov/35339548/	*Prorocentrum minimum*

Aptamers Journal

The Aptamers journal is the official journal of the International Society on Aptamers and will publish studies on all aspects of aptamer research. The Aptamers journal, launched at the end of 2017, is the first-ever peer-reviewed journal aimed to publishing all aspects of aptamer research. The journal is specifically open-access to help make aptamer research accessible to scientists all over the world. Moreover, the journal will consider "negative" data, as we all know that this can be very valuable information when performing aptamer research.

The landscape of published articles in the Aptamers journal to-date is very diverse. For example, topics of the presentations include selection methods, aptamer characterization, chemical modification of aptamers, applications in drug delivery and biomaterials. Furthermore, the publications have been received by authors from all over the world: specifically, USA, Germany, Russia, Australia, Canada, South Korea, Switzerland, Uruguay, Japan, Italy, China, Spain, UK, and Jordan. Finally, the journal accepts several forms of publications, and indeed each of the publication formats have included. In particular, we received three full Research Articles, three Research Reports, five Reviews/Mini-Reviews, one Protocol/Method, and three Meeting Reports/News Articles.

We would like to thank our very diverse and international Editorial Council team and reviewers for helping make the publications of these articles a reality. We look forward to many more aptamer articles in 2022! Please submit your articles for peer-review to the Aptamers journal. All symposium delegates can submit an article before 30th September 2022 for free. So if you'd like to publish your work in the first Aptamers journal, please follow this link http://www.JAptamers.co.uk

Nominations for INSOAP committee

We are currently asking for expressions of interest for membership of the management committee of INSOAP. If you would like to be an integral part of our Society as it moves forward, please contact me at sarah.shigdar@deakin.edu.au.

Updates to the website

We have been working on updating the website (http://aptamersociety.org/aptamer-laboratories/) for INSOAP and you will now see that we have a listing of all aptamer companies throughout the world, as well as a listing of all the aptamer laboratories to date. If we haven't got you listed, please email me at sarah.shigdar@deakin.edu.au. and we will add you to our growing list. We are also providing a careers page so please get in touch with any vacancies you wish to be listed. Finally, if there are any suggestions for improvements to the website, please contact us and we will make the changes.

Aptamer Consortium – Sarah Shigdar

One of issues that we've watched develop over the last few years is the reproducibility crisis that we first discussed in the June 2017 newsletter. At the time we suggested that aptamers could fix some of the issues of reproducibility by providing a more reliable tool for applications. To that end, within the Society, we have been discussing the need for a small group of researchers to come together from both Academia and Industry to work on these guidelines. Our Mission Statement, while still a work in progress, states:

'*The Aptamer Consortium supports researchers, academic institutions, and partners, to promote best practice for aptamer techniques in both diagnostics and therapeutics, to provide guidance for basic and applied research as well as development and commercialisation, and facilitate discussion and interchange of ideas*.'

We have published our first paper from the Consortium in the *Aptamer* Journal in 2022, which will tackle the minimum standards for publishing novel aptamers. If you are interested in sharing your views on the Consortium, please email me (sarah.shigdar@deakin.edu.au).